Spring 2007

Lived Experiences of Female Science Majors at a Two-Year College

Lisa Norton Howell

THE LIVED EXPERIENCES OF FEMALE SCIENCE MAJORS AT A TWO-YEAR COLLEGE

by

LISA HOWELL

(Under the Direction of Delores D. Liston)

ABSTRACT

This study focused on the lives of women majoring in science at a two-year institution. The specific research goal was to investigate the lived experiences of first-year female science majors at Waycross College, relevant to their career choices. The participants in this study consisted of 6 young women enrolled as science majors in the fall semester of 2005. Two interview sessions were conducted during their first year of study. They were able to share their stories as young women and share their perspectives relative to their chosen fields of study. Analyzed using the feminist standpoint theory perspective of Sandra Harding, the interviews revealed several emerging themes. First, all of the participants indicated some form of parental support throughout the duration of the study. They all indicated that one or both parents were a constant resource for encouragement in their career pursuits. Second, the influence of boyfriends played a significant role in the decision-making processes of the participants. Third, most of the participants revealed either negative advising experiences or no advising experiences at all. There was certainly an obvious decline in the quality of the advising experiences for all of the participants. Last, the analysis of the interviews revealed that the participants felt no connection to or within their chosen majors. There was an absence of mentoring programs, friendship networks in the classes, and social or organizational opportunities

that could prove advantageous in improving the experiences of women majoring in the sciences.

INDEX WORDS:Science, Women, Majors, Careers, Two-year college, Experiences, Advising, Feminist standpoint theory

THE LIVED EXPERIENCES OF FEMALE SCIENCE MAJORS AT A TWO-YEAR COLLEGE

by

LISA HOWELL

B.S., Georgia Southern University, 1994

M.S., Georgia Southern University, 1996

A Dissertation Submitted to the Graduate Faculty of Georgia Southern University in Partial Fulfillment the Requirements for the Degree

DOCTOR OF EDUCATION

STATESBORO, GEORGIA
2007

THE LIVED EXPERIENCES OF FEMALE SCIENCE MAJORS AT A TWO-YEAR COLLEGE

by

LISA HOWELL

Major Professor:	Delores D. Liston
Committee:	Stephen Jenkins William Reynolds Sharon Taylor

Electronic Version Approved:
May 2007

DEDICATION

This dissertation is dedicated to the memory of my father,

James Henly Norton,

who died suddenly during the pursuit of my doctorate degree.

He was one of my most influential supporters throughout my life and my education.

Although he has not been here through the completion of my degree, I know that he is in heaven smiling down on me with continued support and encouragement.

I love and miss him dearly.

This dissertation is also dedicated to the memory of my grandmothers,

Vera Leona Wolford and Ruby Lee Norton.

ACKNOWLEDGEMENTS

I would like to thank Dr. Delores Liston for her willingness to chair my dissertation committee and for her overwhelming support, encouragement, and guidance throughout the dissertation process. Without her, this dissertation would not exist. I would also like to thank the members of my committee, Dr. Stephen Jenkins, Dr. William Reynolds, and Dr. Sharon Taylor, for all of their assistance in all aspects of this dissertation. For their contributions, encouragement, and recommendations, I am extremely grateful.

I give special thanks to all of my colleagues and friends who have supported me in this dissertation process including, but certainly not limited to, Ms. Sara Selby, Dr. Donna Saye, Dr. Jim Helms, and Ms. Joan Dial. I appreciate their willingness to encourage me to keep going when I was ready to throw in the towel. Their continued support has given me the strength I needed to complete this dissertation.

Last, but certainly not least, I would like to thank my family. I wish to thank my parents, Vera Little and the late James Norton, for all of their encouragement and support that they gave me throughout my education and my life. They have always provided the love and prayers that I needed to make this happen. I wish to thank my husband, Eddie, and my daughter, Elizabeth, for all of their love and support while I worked on completing this dissertation. Thank you for your patience and all of the time you sacrificed while I worked long hours to get it written. All my love!

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER 1

INTRODUCTION

As an advisor and assistant professor of mathematics at a small two-year college in South Georgia, it is my responsibility to assist students in determining their degree program requirements and encourage them to pursue a career that meets their own personal and professional needs. Over the years, I have witnessed a small number of women students choose a science major. Science majors at my institution include agricultural and environmental sciences, biological sciences, chemistry, computer information systems, computer science, mathematical sciences, pre-engineering, and physics. I have watched as several of these women who initially pursue a science-related field change to a major that is not science-related such as early childhood education or sociology. By switching from a science-related field to a field such as early childhood education, these women encounter a dramatic loss of income potential. I have often wondered about and questioned the reasons for their choices as well as the reasons why some had a sudden change of interest. I wanted to better understand what they encountered both academically and personally as they began their educational journey in a male-dominated field of study. Thus, I decided to investigate the first-year experiences of women majoring in science at Waycross College.

My initial interest in gender issues in the sciences began about ten years ago. As an instructor of mathematics at Georgia Southern University, I had the opportunity to participate in the InGear gender equity program, a study that prompted me to recognize gender biases within my own classroom. As a result of this program, I became interested in the gender issues that existed in the areas of mathematics and science. From that point

on, I focused all of my research endeavors around this topic. I have examined research ranging from gender stereotypes to achievement gaps among men and women. I have also found much research on gender-related issues in elementary, middle, and secondary schools. However, my current interest is the two-year college level.

I teach at Waycross College, a small two-year college in South Georgia, and have the opportunity to advise students pursuing various degree programs. Our students are at a critical decision making stage of their lives. They are declaring their majors. Typically, many students who are certain about their interests in pursuing a science career probably do not consider a two-year college as an option. They may go ahead and dive into a science program of study at a four-year institution. However, in our rural area, many of our students are first-generation college students who in many cases are not encouraged to pursue a science career for various reasons. Furthermore, the atmosphere of a four-year institution would probably prove to be way too overwhelming for many of our students. They may have financial burdens, geographical concerns, personal obstacles and even self-esteem issues that make the option of a two-year college more suitable for the completion of their core curriculum courses. While this is true for both men and women students majoring in the sciences, the representation of women in general is still much lower than that of men in terms of science degrees earned and science careers held, according to a 2001 National Center for Educational Statistics report. Because of this continued underrepresentation of women in the field of science, I would like to see what two-year college females majoring in science are experiencing so that I, as an advisor and mathematics professor, can better relate to their needs and desires as they begin their educational quest toward a science career.

Personal Justification

My study of the experiences of two-year college females majoring in science grew from my own personal experiences as a female science major at Waycross College about fifteen years ago. I began college as an accounting major because of my passion for numbers. I enjoyed the computational challenges and mathematical puzzles of income statements and balance sheets. In high school, I chose to take science and accounting electives to fulfill my graduation requirements simply because they involved numbers. At the time, I did not recognize any gender-related issues in my science classes, which consisted of both males and females. No discriminatory events, to my knowledge, ever took place. All of my high school science and math courses were taught by women.

As my college career began to take off, I suddenly realized that I did not enjoy the 'business' component that was attached to being an accounting major. I was placed in an economics course and had absolutely no interest in the workings of the economy, supply and demand, and the like. Thus, I immediately declared mathematics as my major. I went through the motions of taking core classes along with the required mathematics courses that were indicated in the college catalog, which I chose to analyze on my own without the aid of an advisor. While I was enjoying the mathematics courses and making the best out of my college experience, I was falling apart on the inside. I could not make a decision about my career goals. I struggled with myself trying to determine what I wanted to do with my life.

I had external influences trying to steer those decisions. At the time, I personally did not want to teach mathematics. Everyone kept telling me that I could not possibly

major in mathematics forever if I did not intend to teach. No one offered any other suggestions and my advisor simply signed my registration form and enrolled me in courses suitable for a mathematics major. Because of time constraints on advising appointments, he really had no more time to question my career goals or offer advice on what I should pursue as a career. Thinking back, I did not realize that an advisor could provide career information. I assumed that scheduling of classes was his only responsibility. Had I taken the initiative to go back and meet with him after registration, I would not have known what questions to ask anyway. My parents were encouraging and supportive of me actually going to college but had not been very vocal about my career choices. They were simply excited that I had chosen to attend college because no one in my family had done so.

I had a boyfriend who was an engineering major who was planning to move to Atlanta. While he did not push engineering as an option for me, it was the only option that I had been exposed to that involved mathematics. At the time, Georgia Southern University did not offer an engineering degree, but I chose to transfer there in order to complete the additional core requirements for an engineering degree. Although I knew that I could not stay at Georgia Southern University to complete the entire degree, I was not quite ready to move to Atlanta and attend Georgia Tech as a declared engineering major. I did not want my identity defined by my relationship with my boyfriend. To establish my own identity, I felt the separation from him was necessary. His lack of an opinion about my career plans gave me the impression that he did not want me to 'follow' him to Atlanta.

At Georgia Southern University, I continued to major in mathematics and complete all required courses offered there that would prepare me for transfer to the Georgia Institute of Technology in Atlanta. I was still torn on the inside. With no engineering courses under my belt, was this really what I wanted to do? Would my boyfriend think that I was 'following' him? How would I manage being one of the few girls on the Georgia Tech campus? Being a small town girl, could I handle living in Atlanta? What kind of job would I have after I graduated? Would I have to wear a hard hat and work with a crew of men every day for the rest of my life? Was I even capable of majoring in science? These were the questions that family and friends were beginning to ask me. As the time to transfer approached, my mother had become the most vocal in expressing an opinion about my plans at this point. The more those around me continued to question my choices, the more I began to question them as well. I was so confused. My boyfriend would not offer any advice. He just kept telling me to do what I thought was best for me. While I was not pushing for any kind of commitment from him, I would have appreciated his opinion of my plans. I did not want him to have the impression that I was 'following' him instead of a career.

My experiences at Georgia Southern University were not desirable because of my unresolved career decisions. I was taking science courses in which I was the only female enrolled, I was isolated and ignored by professors, I felt as though they viewed me as incapable, and my advisor was absolutely no help. My parents had become more vocal regarding my decisions. While my father was extremely excited to have a daughter pursuing an engineering degree, he did express his concerns about his daughter moving to downtown Atlanta. My mother made it clear that she opposed my decisions. She felt

that I was in pursuit of something that was simply “not suited for women.” I felt so isolated and alone. It felt like no one was in my corner, including myself at times. I was really feeling the pressures of being a female in a male-dominated field.

After a year of taking courses at Georgia Southern University, I applied and was accepted to Georgia Tech. While it generated a big boost in my confidence, I decided not to go. I continued my course as a math major at Georgia Southern University. Although I continued to struggle with my career aspirations, I felt like a load had been lifted off of my shoulders. I no longer had to experience the isolation that I felt in those male-dominated courses. While mathematics was considered a science, things were different. I was taking classes with lots of women. Although most of them planned to teach high school mathematics and I was still uncertain about my future, it was a very welcoming and supportive environment to be in compared to my prior experiences. Once I earned my undergraduate degree in mathematics, I had no idea where I wanted to work or what I was going to do with my education. Thus, I decided to stay at Georgia Southern University and attend graduate school. My boyfriend was still in Atlanta working toward an engineering degree with intentions of pursuing a master’s degree as well. My parents were proud of my accomplishments but had very few suggestions regarding my career goals, or should I say the lack thereof.

While I knew that teaching was an option, I still had no desire to teach high school. While in graduate school, I had the opportunity to teach college students and decided that teaching college mathematics was what I wanted to do. After completing my master’s degree, I was offered a position as a temporary instructor at Georgia Southern University. I loved the position and held it for two years when a tenure-track

position at Waycross College became available. I was anxious to return to Waycross, although I knew my boyfriend would not be working in Waycross once he completed his master's degree. Because it was such a small town, Waycross did not have an engineering career available at the time for his credentials and job expectations. My boyfriend and I had grown apart after about six years of dating long distance. My decision to pursue the position at Waycross College put an end to our relationship. At the conclusion of the application and interview process, I was offered the position and graciously accepted it.

At this point in my life, I was comfortable, confident, and happy with my career and all that I had accomplished. Although I love teaching mathematics, I sometimes cannot help but wonder if I was shortchanged. Would I love a career in engineering or possibly a mathematical research career more than I love my current career? In my heart, I view myself as a mathematician, a scientist. However, when I examine representation and statistical comparisons among gender, I realize that even in the science academic profession, I am underrepresented in terms of rank and salary compared to my male counterparts in the field (Saye, 2002).

With all of the strides made in the 1980s and 1990s to increase girls' interests and participation in the sciences at all levels of education, many women remain shortchanged in the sciences for various gender-related reasons and are ending up being channeled into careers that have less earning potential. Even with the loss of income potential, women are trained to accept the compromise and even come to believe that they enjoy the career they have been channeled into, or perhaps that the decision was of their own prerogative. In turn, the field of science is shortchanged as well (AAUW, 1991). I hate to even

consider the potential brain-power denied to the field of science because of such compromises. Many of the contributions that these women could have made in the sciences are now tucked away, never to be considered again. If enrollment and retention of women in the sciences becomes more of a focus at the two-year college level, then more of those contributions may actually become a reality.

Because of my own personal experiences, I have since questioned whether or not females majoring in science today were having the same experiences that I had almost fifteen years ago. It seems possible to have some kind of support system in place for women who choose to pursue science careers. My desire is that they are now being encouraged by family, friends, and advisors to follow their dreams and become whatever they desired. I hope their experiences are not like mine! At the very least, I want to be able to make it more of a focus at my institution and enliven some unnecessarily foreclosed options for the women that I teach and advise. Thus, a study of the lives of such women and the decisions that they make became the heart of my research.

Research Goal

This study focused on the lives of women majoring in science at a two-year institution. My specific research goal was to investigate the lived experiences of first-year female science majors at Waycross College. My research question, *what are the lived experiences of first-year female science majors at Waycross College, relevant to their career choices*, was answered by interviewing women majoring in the sciences during their first year at Waycross College. Through individual interviews, I attempted to capture the integrity of their experiences and to gain a better understanding of how to interact with them as a professor and advisor. Using the feminist standpoint research

lens, I aimed to better understand the lives of women science majors at Waycross College. I addressed concerns that are women-centered and inquiries that could foster knowledge that will benefit women and their status at my institution. My interview questions, located in Appendix D, focused on the gender-related concerns that are addressed in the review of literature. The qualitative interviews were analyzed using the feminist standpoint theory perspective of Sandra Harding (2003).

Significance of the Study

This study is significant because it examines the lives of women during their first year as a science major at Waycross College. It will provide me and other faculty advisors with information regarding the career choices of these women so that we can become better advisors and professors. It may also suggest ways for improving or possibly creating a support system that encourages these women to continue their pursuit of a science career. This study should offer these women more confidence and provide them an outlet for any existing fears or frustrations that they encounter during their first year of college. This study may offer suggestions as to how advisors and professors could encourage female science majors so that they are retained in the science field. By retaining these women in the science field, their representation and contributions in the sciences could improve the field as a whole. Rather than analyzing course content and methods of instruction in science courses, this study explores social and cultural aspects that play a key role in what and how these women experience in the field of science.

Assumptions

For this study, it was assumed that all female science majors would be willing to participate in the interview sessions. Furthermore, it was assumed that scheduling the

interviews would not be an issue since I was willing to arrange the interview sessions at any time that was necessary to meet the participants' schedules. It was assumed that students may withhold information in their responses since some of them were actually students in the courses that I taught.

Based on my past experience as a female science major, it was recognized that I would have a standpoint that would allow me to observe the experiences of female science majors. Finally, the perspective from feminist standpoint assumed that the experiences of women are different from the experiences of men.

Limitations

The focus on data gathered from only one two-year institution in the state of Georgia limited the study in that it created a 'close up' study of data—data gathered only from the institution in which I teach and advise. Furthermore, my study was somewhat limited by the fact that not every female science major participated in the interview sessions. One female science major that was initially willing to participate in the study was unable to attend several scheduled interview sessions and after numerous attempts could not be contacted.

CHAPTER 2

REVIEW OF LITERATURE

Theoretical Framework

The theoretical framework of this research study was grounded in feminism, specifically the feminist perspective of Sandra Harding (1997). Sandra Harding and Merrill Hintikka (1983) argue that "feminist research shares four characteristics:

> (1) the questions asked emerge from women-centered concerns; (2) the purposes of inquiry stem from the need to foster new and more accurate knowledge for the benefit of women and society; (3) the hypotheses and evidence are not transparently unbiased and apolitical; and (4) the relationship between the researcher and the subject of study is a mutual and reflexive one (p. 212).

While focusing on these characteristics of feminist research, my goal was "to uncover and remove blinders that obscure knowledge and observations concerning human experiences and behaviors that have traditionally been silenced by mainstream research" (Ardovini-Brooker, 2001, ¶ 3). This type of research places women's lives and experiences at the forefront of an investigation in order to obtain and maintain accounts of historical, political, and social changes that occur within a male-dominated society.

Feminist Standpoint Theory

One type of feminist research that emerged in the 1970s and 1980s is feminist standpoint theory. Feminist standpoint theorists argue that

> not just opinions but also a culture's best beliefs – what it calls knowledge – are socially situated. The distinctive features of women's situations in a gender-

> stratified society are being used as resources in feminist research (Harding, 1991, p. 119).

Women's experiences as told by women within a dominating and oppressing culture were the basis of this research study. Jody Bart (1998) argues that feminist standpoint theories "reject the notion of an unmediated truth, arguing that knowledge is always mediated by a myriad of factors related to an individual's particular position in the socio/historical landscape, at a specific point in history" (¶ 12). Although feminist standpoint theorists reject the notion of an unmediated truth, they do not reject the notion of truth altogether.

> It is through feminist struggles against male domination that women's experience can be made to yield up a truer image of social reality than that available only from the perspective of the social experience of men of the ruling classes and races. There is, therefore, a kind of truth claim being made about the 'reality' which is perceived by the oppressed subject in relation to the 'reality' which the oppressor would have them perceive (Nottingham Trent University, n.d., ¶ 7).

Standpoint theory is a way of confronting and moving beyond unequal ways of knowing among the oppressed and the oppressor while developing a political basis for changing the social structure.

History of Standpoint Theory

"Standpoint refers to a position in society, a way of making sense that is affected by and can in turn help shape structures of power, work, and wealth" (Hennessy, 1993, p. 14). Standpoint theory as an approach to research dates back to Hegel and was later adopted by Marx, who applied it to the working class in a capitalist system. The Marxist

notion of standpoint epistemology "argues that knowledge is the product of our active engagement with the world through labour" (Pohlhaus, 2002, p. 283). Thus, knowledge is acquired through social interaction with the world. Marxist standpoint epistemology, however, focuses on class differences neglecting to address other social divisions within the working class such as gender and race. "Indeed, no theoretical framework was created within classical Marxism to explore the distinctive forms of oppression and sources of resistance that might characterize different such groups" (Harding, 2003, p. 8). This Marxist epistemology is the foundation for feminist standpoint epistemology which has "posited feminism as this sort of position, a way of conceptualizing reality from the vantage point of women's lives" (Hennessy, 1993, p. 14).

Sandra Harding's Feminist Standpoint Theory

Although many authors, including Dorothy Smith (1987), Nancy Hartsock (1997), Patricia Hill Collins (1990), Hilary Rose (1983), and Allison Jaggar (1989), contributed to feminist standpoint theory, Sandra Harding expresses the position most clearly. Thus, Harding's feminist standpoint theory perspective will be the lens through which this research study will be viewed. According to Harding (1991), feminist standpoint theory "tries to construct knowledge from the perspective of women's lives" (p. vii). As a female mathematician and researcher, I will analyze the lives of female students at a two-year college so that "the observer and the observed are on the same casual plane, shaped by the same kinds of social forces" (Harding, 1991, p. 308). The 'same casual plane' in my research study is the female two-year college math and science arena, a social system in which both the research subjects and I have a connection. Through qualitative research methods, I will use my personal and professional experiences to analyze other

women's experiences in the fields of mathematics and science. This research perspective has the ability to place women at the forefront of research while recognizing and validating their knowledge. If successful, the feminist standpoint research approach could

> create women's collective, group consciousnesses that would enable women's groups to design, and to value and engage in, the kinds of research that would enable women to transform their consciousness into an oppositional one and to begin to see the possibility of ending the oppression (Harding, 2003, p. 6).

Feminist standpoint theory has enabled women's knowledge to become the focus of research and has made numerous contributions to feminist research.

Criticisms of Feminist Standpoint Theory

While feminist standpoint theory has its strengths, it has also encountered a considerable number of criticisms. One major criticism revolves around its Marxist descent. Some critics are simply not open to any Marxist notions and refuse to consider standpoint theory as a foundation for any positivistic research. Harding's (1997) response is that "the Marxian epistemology/sociology of knowledge provided the only resources powerful enough to counter the prevailing conceptual frameworks for the kinds of natural and social science projects of feminism in the 1970s and early 1980s" (p. 383). During the conception of feminist standpoint theory as an approach to research, Marxist notions were the only ones present that could provide a strong enough foundation from which it could develop into its own unique perspective.

Another major criticism made against feminist standpoint theory revolves around its universalism. "Faced with competing feminist knowledge claims and political agendas, a universal woman's standpoint theory can have little adjudicating force" (Bart, 1998, ¶ 11). Critics, both feminist and non-feminist, argue that feminist standpoint theory is too relative because it puts women on an equal plane and neglects the differences that may exist among them. In other words, by defining this type of research as a women's standpoint, one may tend to view women as one entity, equal except for gender. Some critics insist that the definition of women began to blur the perspective, questioning feminist standpoint theorists' ability to consider the differences among them. Pohlhaus (2002) argues that "failing to account for such differences as race, sexuality and economic class reinforces relations of oppression by obscuring the different interests created by social hierarchies other than gender" (p. 286). Harding addresses the obvious fact that women have different conditions and experiences, noting that "standpoint theory has often been accused of the very same kind of 'centered' and 'essentialist' ontology that feminists criticize in androcentric accounts" (Harding, 2003, p. 8). Through interviews, I wanted to recognize and address their commonality (gender) as well as the characteristics that distinguish them, such as socioeconomic status, race, educational backgrounds, etc. I then applied 'intersectionality' with the standpoint approach in order to "analyze social relations from the standpoint of their daily lives…" (Harding, 1997, p. 385). 'Intersectionality' was created by feminists of color, multicultural, and global feminisms. This process required that I start my research from women's lives while analyzing their cultural differences as well.

An additional criticism to feminist standpoint theory is that not everyone is capable of successfully using this approach to research. Can all women use this approach? What about men? "Harding emphasizes that being a woman does not yield a ready-made critical stance on the world, but rather the situation of women provides the questions from which one must start in order to produce more objective knowledge" (Pohlhaus, 2002, p. 287). In other words, Harding argues that being a woman is not a necessity for successful research; rather research and knowledge should start from women's lives and the diversities within. Harding argues that men can be feminists and implies that men can create a feminist standpoint. While some critics disagree, arguing that men cannot be on the 'same casual plane' with the women being researched, I believe that anyone can do feminist research using this perspective as long as they analyze women's lives from the women's perspectives being researched. However, I also believe that feminist standpoint is more difficult to employ if the researcher does not have some historical or experiential similarities. "The primary responsibility for defining one's own reality lies with the people who live that reality, who actually have those experiences" (Collins, 1990, p. 34). So, although the women being researched are defining their reality through their experiences, the standpoint of the researcher can impact the analysis of the shared realities. Thus, I argue that in order for feminist standpoint theory research to be effective, researchers must be able to establish a feminist standpoint and clearly establish the same casual plane that they share with those being researched.

By defining my personal standpoint, I strove to guard against the criticisms of feminist standpoint theory. I recognized my relationship with the participants and

identified the plane which we all share. My experiences as a female science major established a connection with the experiences of the female science majors in my study. I also applied Harding's recommendation of strong objectivity. "What women say and what women experience do provide important clues for research designs and results, but it is the objective perspective from women's lives that gives legitimacy to feminist knowledge" (Harding, 1991, p. 167). Stronger objectivity

> incorporates reflexivity and democratic inclusion as the key features of more objective processes of inquiry…strong objectivity does not accord epistemic privilege to the standpoints of the oppressed, considered by themselves. Rather, it prefers representation produced by communities that include them over representations produced by communities that exclude them (Anderson, 2003, ¶ 99).

One aim of this research study was to unveil the experiences of the women involved in my research and to validate their knowledge using feminist standpoint theory as the foundation or starting point of my research. I used their shared experiences as science majors as a means of improving my interactions with them and their representation at Waycross College.

Related Research

Statistical Trends of Women in Science

Throughout history, women have made their mark in the sciences by overcoming obstacles related to gender. "The careers of Marie Curie, Lise Meitner, Rosalind Franklin, and Rachel Carson provide us with benchmarks of how much has been achieved during the past century and how far the distance to equality was in each of their

experiences" (Etzkowitz, Kemelgor, & Uzzi, 2000, p. 17). Because of the determination of these women and other female scientists, the female population has never been more highly recognized for its achievements in the sciences than it is today. According to the National Center for Educational Statistics (NCES, 2001), the percentage of women who received degrees in engineering increased from 0.4 in 1966 to 20.1 in 2001. Other physical sciences and natural sciences had significant increases as well. Today, more women are encouraged and motivated to pursue careers in the sciences.

Although tremendous strides have been made in the past several decades, the gender gap in science achievement and participation still exists (Campbell & Clewell, 1999). In 2001, NCES reports indicated that of the 721,627 bachelor degrees awarded to women, only 82,419 were awarded in the science fields, illustrating only 11% of the degrees in the sciences. However, of the bachelor degrees awarded to males, 24% of them were conferred in the sciences. The difference in the percentage of bachelor degrees awarded in the sciences among gender clearly shows that a significant gap still exists. The gap widens of course for masters degrees and doctoral degrees in the sciences. In terms of science careers in 2001, 72.9% are held by males while only 27.1% are held by females.

At Waycross College specifically, approximately two-thirds of our students are female. However, since 2002, the number of males enrolling in the sciences has been more than double the number of females in the sciences. Because the percentage of males at Waycross College is so low compared to that of females, the fact that there are twice as many male science majors represents a much higher percentage of male representation in the field at Waycross College. Since 2001, the number of women

enrolling in science degree programs has not exceeded seven, while the number of women science graduates has not exceeded five. In 2005 alone, Waycross College graduated 121 students with twelve of them earning science degrees. Of those twelve, only two were women. Statistical trends such as these exist across all levels of education within the United States.

Barriers and Perceptions

For decades, numerous gender-related research studies have documented the persistence of the gap that exists in the sciences, placing much emphasis on barriers that women encounter in the sciences, including gender stereotyping (Tiedemann, 2000, 2002; Roger, & Duffield, 2000), achievement gaps (Erwin & Maurutto, 1998; Quinn & Spencer, 2001; Ganeshananthan & Reisberg, 2000), and attitudes and perceptions of science and science-related careers (Enman& Lupart, 200; Terry Baird, 1997; Rosser & Lane, 2002; Subotnik, Stone, & Steiner, 2001; Taber, 1992). In regards to gender stereotyping, studies have examined student (Taber, 1992), teacher (Tiedemann, 2000, 2002; Roger & Duffield, 2000), and parental perceptions of gender in the science arena (Tiedemann, 2000). While Taber (1992) revealed a consistency among male and female students' perceptions of science careers in general, study results indicated that careers perceived as most suitable for men and least suitable for women were those considered to be strongly related to physics. Research has also revealed gender stereotypes in the sciences among teachers and parents. Several studies have concluded that teachers perceive boys to be more competent than girls in science courses (Tiedemann, 2000, 2002). Teachers perceive boys to have higher abilities and higher effort resources than girls. Despite efforts to alter teachers' perceptions of science as a masculine field,

schools continue to persistently define science subjects as masculine (Roger & Duffield, 2000). While parents are considered a major influence in both male and female interests in the sciences (Gavin, 1996; Monhardt, Tillotson, & Veronesi, 1999), a significant number of parents perceive boys to be more competent in science than girls (Tiedemann, 2000). According to Mervis (2001), a culture that assumes that boys are more capable of studying science must undergo a change in order to attract more women into science fields.

Over the past several decades, research has illustrated differences in science achievement among males and females. According to the National Assessment of Educational Progress (NCES, 2001), boys and girls had similar mathematics and science proficiency scores at age nine, but by age thirteen the gap begins to appear. The same 1994 analysis found that seventeen-year-old females scored significantly lower than boys in mathematics and science proficiency tests. Even at the collegiate level, males have been shown to demonstrate higher science achievement than females (Erwin & Maurutto, 1998; Quinn & Spencer, 2001). In the1996 National Summary Reports by the College Examination Board, men scored higher than women on the mathematics and science achievement tests and advanced placement examinations. Ganeshananthan and Reisberg (2000) reported that "men still held an advantage on 1999 SAT math scores, scoring 35 points higher than women" (p. 68). Research has also concluded that science achievement is a direct influence on students' desires to pursue science-related careers (Miller, Petra, & Kotte, 2002).

Research indicates gender differences in students' interests in science (Enman & Lupart, 2000). According to Terry and Baird (1997), male and female students indicated

a positive attitude toward women in science. A positive correlation was also found among science interests and science ability (Terry & Baird, 1997). Other research studies have examined attitudes of female scientists. Results indicated that the females regarded family obligations and time management as major challenges within their careers (Rosser & Lane, 2002; Subotnik, Stone, & Steiner, 2001). Rosser and Lane (2002) also noted that gaining respect from peers was another obstacle encountered by women in science careers.

Initiatives to Improve the Status of Women in Science

While many of the barriers in the sciences have been identified, numerous programs have been implemented to address the underrepresentation of women in the sciences. Programs have been implemented nationwide and at all levels of education in order to improve the current status of women in the field. Some programs have offered summer workshops (Richardson, Hammerich, & Livingston, 2003; Quimbita, 1991), mentoring programs (Rosser, 1990; Quimbita, 1991; Richardson, Hammerich, & Livingston, 2003), experimental laboratory activities (Quimbita, 1991; Clewell, Anderson, & Thorpe, 1992), and skill-builder opportunities (Clewell, Anderson, & Thorpe, 1992). In their book *Breaking the Barriers*, Clewell, Anderson, and Thorpe (1992) provide the 'guidelines for successful implementation' of programs that will help females succeed in math and science. They suggest setting goals for the program, choosing the appropriate participants, providing adequate training of those involved, soliciting funding from appropriate sources, and properly assessing the goals and results of the program. They even provide an overview of effective mathematics and science

programs, including Family Math Program, Finding Out, Operation SMART, and Project MiCRO.

While all of these programs promote mathematics and science in general, each has its own unique purpose. For instance, Family Math Program originated out of Berkeley, California, and offers a series of workshops for K-8 minorities and females as well as their families. The workshops were designed to promote the use of mathematics in the home and improve mathematics achievement. Finding Out, an in-school program held in Stanford, California, offered black and Hispanic females in grades two through five, an opportunity to discover science through hands-on, cooperative learning projects. The students were also encouraged to join science and mathematics clubs. In New York City, Operation SMART targeted black and Hispanic females in grades one through eight. Through year-round projects, in and after school programs, and Saturday sessions, students were exposed to career counseling, guest speakers, field trips, competitions, and projects, all of which were connected to science. This program in particular was noted for its extensive parental and teacher involvement. While Project MiCRO in Atlanta, Georgia also had parental and teacher involvement, its purpose was to promote computer literacy. Black and Hispanic females in grades six through eight were exposed to computer technology through an after school computer lab experience. Clewell, Anderson, and Thorpe (1992) offer an extensive review of these programs along with many others that emphasize mathematics and science for other minorities as well.

Since 1988, the Women in Engineering (WIE) initiative has been targeting participation and retention of women in engineering. Rosser (1990) reported that the WIE initiative focuses on all levels of engineering study and that “programs that involve

tutoring, ‘big sisters,’ mentoring, support groups, advising, volunteering, faculty seminars, and international exchanges have helped to identify and retain more than forty engineering students” (p. 43). Housed in Seattle, Washington, WIE involves the state’s public and private institutions that offer engineering degrees.

An article by Richardson, Hammerich, and Livingston (2003) reported the outcomes of the three-year Sisters in Science program. “Through a multifaceted, 2-year intervention cycle, students were exposed to gender-sensitive, constructivist, integrated mathematics and science instruction in school, after school, and during the summer months” (Richardson, Hammerich, & Livingston, 2003, p. 3). The Sisters in Science program included mentoring opportunities, extensive teacher training, and parental involvement. Results indicated that the fourth and fifth grade girls who participated in the program showed an increase in achievement, perceptions, and attitudes in science and mathematics.

Quimbita (1991) summarized some programs offered by or in conjunction with community colleges. She noted several programs that encouraged enrollment in the sciences, including the Math, Science, and Technology Summer Youth Enrichment Program at Delgado Community College; the Mathematics, Engineering, and Science Achievement/Minority Engineering Program (MESA/MEP) at America River College; and the Community College Summer Research Program involving colleges in Los Angeles. While not all of these programs focused specifically on the recruitment of women, they all had a link to a community college science environment. At Delgado Community College, an array of learning opportunities ranging from hands-on laboratory science activities to field trips and speakers were offered to junior high school students

through three-week summer minicourses. Follow-up interviews with the participants revealed that their interest in science had been stimulated. The MESA/MEP program was designed to recognize science achievement through scholarships and awards and to offer leadership and fellowship opportunities for high school students. The goal of the program was to bridge the gap between the high schools and the community colleges and universities in the area. Finally, Quimbita discusses the Community College Summer Research Program in Los Angeles. She elaborated on the uniqueness of its mentoring research model that pays two-year college students to participate in research activities (p. 1). All thirty women and minority participants went on to complete their four-year degrees in science.

Status of Women in the Field of Science

Although numerous studies have been conducted regarding programs that have been initiated to encourage the participation of women in the field of science, other studies have analyzed the current status of women in the field of science in order to show the difficulties women continue to face. For instance, several studies (Rosser, 2003; Saye, 2002) have explored the current status of women in mathematics and science academe. Rosser, the dean of the Ivan College of Liberal Arts at Georgia Institute of Technology, utilized the results of a National Science Foundation funded program titled Professional Opportunities for Women in Research and Education (POWRE) and surveyed POWRE program awardees. The women were asked to identify the "most significant issues/challenges/opportunities facing women scientists today as they plan their careers" (Rosser, 2003, p.2). Results indicated that in order for institutions to attract and retain more women science faculty, they need to address the difficulty women face in

balancing work and family. In a similar analysis, Saye (2002) addressed the current status of women in academia as well. However, her focus was to understand the status of women in mathematics departments in Georgia colleges and universities. Both of these studies indicated that even in educational mathematics and science positions, gender discrimination and other barriers that refuse the advancement of women need to be addressed by institutions in order for enrollment and retention of women in the field to improve.

While these studies focused on women that currently have academic careers, numerous studies (Jeffe, 1993; Olson, 1993; Sax, 1994; Sayers, 1987; Scanlon, 1994) have examined women students and issues regarding their career choices. In terms of women students' decisions to major in science, Sax (1994) found that women are more likely to persist in a major if they are surrounded by other female peers in the field. While her study did not directly focus on the field of science, her analysis of over 400 male and female four-year college and university students only emphasizes the need for a support system for women pursuing a college education. Another study (Scanlon, 1994) explored student career choices at the university level. The study sampled twenty undergraduate women from various career types and found that parents were very influential in the women's career commitments. A career planning classification system revealed that eighteen of the women expressed a high level of career commitment while only two recorded a moderate career commitment. However, like Sax's study, Scanlon's investigation encompassed career commitments in all fields of study, not just the science fields.

Focusing on retention, Hollenshead, Yonce, & Wenzel (1994) conducted a qualitative study of women graduate students in mathematics and physics in a research university. They found that women were more encouraged in cooperative learning environments and discouraged by more competitive atmospheres. Smaller groups also promoted networking among students and fostered support systems. Findings also indicated that women need encouragement from family, peers, and faculty members in order to be retained in graduate programs.

Olson (1993) examined women students at the four-year college and university levels as well. Similar to my study, however, she included community college women in her analysis. Two hundred and seventy women ranging from eighteen to twenty-two years of age completed the Myers-Briggs Type Indicator and the Relationship Self Inventory. No significance was found relating career choice with the descriptive results of these surveys. Since the quantitative analysis did not reveal patterns predicting career choice, "qualitative interviews with eight women of the study added voices and provided a clearer understanding of the methods these women employ when making career choices" (Olson, 1993, p. xi). The interviews revealed that the most of the women were not provided career information or given vocational personality assessments. Most of them admitted that their career decisions had been reflective of what others told them they should do.

A qualitative study by Seymour and Hewitt (1997) examined women's perceptions in order to understand why women are leaving the science field. They reported that women students are discouraged from pursuing their science interests by peers who label them as weird or asocial. Women college students were also reported to

experience more negative feedback and open discrimination than men. Another study argued that such forms of discouragement disappear as the percentage of women in the major increases (Davis, Ginorio, Hollenshead, Lazarus, & Raymond, 1996; Sax, 1994).

Importance of the Two-Year College

While much research has focused on women and their representation in the field of science, the focus of this study is strictly women who are entering freshmen at the two-year college level. According to the National Center for Educational Statistics, there were over six million students enrolled in two-year colleges in 2001, accounting for more than half of the post-secondary enrollment in the United States. The two-year college acts as a stepping stone for students who, for whatever reasons, cannot commit to a four-year environment. The overarching mission of all two-year colleges is to prepare students for transfer to four-year institutions. Some also offer technical or career preparation programs as well. Several research studies conducted in this type of setting have focused on the purpose of the two-year and community college and the characteristics of the students that are served by these institutions.

Laanan (2003) conducted a study involving over 13,000 college freshmen. While students at private and public two-year colleges were shown to have many disparities regarding their characteristics and their career aspirations, both groups indicated that high school preparation and self-concept of academic ability contributed "positively to high educational aspirations" (Laanan, 2003, p. 513). Thus, the types of courses taken in high school and the amount of confidence a student has in himself or herself are predictive of higher educational goals.

Another study conducted at the two-year college level involved baccalaureate degree holders. Townsend (2003) found that the technical college component of the community college was what inspired the post-baccalaureate students to choose to return to college for additional studies. Many indicated that they needed the technical training required for advancement in their current careers or a career change altogether. Interestingly, the 2004 Community College Survey of Student Engagement (CCSSE) reported that between 12% and 28% of community college students already have postsecondary degrees.

Phillippe and Valiga (2000) reported on the results of an AACC study involving community colleges documenting that single parents, first generation students, individuals forty and over, and students already with degrees make up the typical community college population. They also indicated that while 42% of the students attending community colleges during the 1995-1996 academic year had intentions of completing a bachelor's degree, only 20% of them actually did. According to the American Association for Colleges and Universities (AACU), the results of the 2004 Community College Survey of Student Engagement (CCSSE) highlighted the profile of the community college student population as well. It found that 58% are women, 30% are racial minority, 32% are thirty years old or older, 36% are traditional, 64% attend part-time, and 65% depend on their parents. In terms of the Waycross College student population as of fall 2005, our director of institutional research reported that about 67% are women, 18% are racial minority, 27% are 30 years or older, 46% are traditional, and 52% attend part-time.

Inconsistencies in these comparisons could be the result of the definition of a two-year college. It is important to note that the two-year colleges and the community colleges are often referred to interchangeably within much of the research. Since this study involves the two-year college environment, it is essential to make the distinction between the two types of institutions as they coexist in the state of Georgia. While the community colleges do offer associate degrees and programs that prepare students for four-year transfer programs, they also serve as technical institutions. The two-year colleges offer associate degree programs and some certificate programs, but no technical programs. Thus, the student bodies and the learning environments at the community colleges differ from those at the two-year institutions.

The profile of the two-year college student is unique for the Waycross College service area. My institution enrolls students who are typically low to middle class, first-generation college students. As of fall 2005, 73% qualified for some form of financial assistance. On average, Waycross College enrollment is around 800 each year. Approximately two-thirds are female. The role of the two-year college is unique. According to the college catalog (2006),

> Waycross College, an associate degree granting institution of the University System of Georgia, exists to provide programs of higher education for citizens of the immediate and surrounding communities. The College's philosophy is to provide opportunities for those who need special preparation for regular college-level courses, while giving well-prepared students immediate access to transfer courses that can be applied toward advanced study appropriate to their academic goals (p. 10).

With this mission in mind, I investigated the lived experiences of females at Waycross College. The research at the two-year college level has proven to be extensive but has not specifically addressed the lives of female science majors. Using feminist standpoint theory, I attempted to fill this void in the research by exploring the first-year experiences of these students as they prepare for future study.

CHAPTER 3

METHODOLOGY

Introduction of Qualitative Approach

As previously mentioned, my research study involved qualitative research methods. Since most research in the sciences has traditionally been viewed as "hard science," traditional quantitative methods have been implemented to investigate the field. However, statistical analyses resulting from this type of research provides only a positivistic view. Qualitative inquiry, on the other hand, opens the door to more personal accounts and recognizes the individual differences among participants and gives them an opportunity to express their perceptions regarding the phenomena being studied. Qualitative researchers "study things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them" (Denzin & Lincoln, 1998, p. 3). Thus, I incorporated qualitative research methods into my study in order to accomplish my research goal.

This study focused on the lives of women majoring in science at a two-year institution. My specific research goal was to investigate the lived experiences of first-year female science majors at Waycross College, relevant to their career choices. My research question, *what are the lived experiences of first-year female science majors at Waycross College, relevant to their career choices*, was addressed by interviewing women majoring in the sciences during their first year at Waycross College. Through individual interviews, I have attempted to capture the integrity of their experiences and gain a better understanding of how to interact with them as a professor and advisor in the sciences. Using the feminist research lens, I have attempted to understand the lives of

women science majors at Waycross College. The qualitative interviews were analyzed using the feminist standpoint theory perspective of Sandra Harding (1997). Using feminist standpoint theory, I have provided each woman the opportunity to tell her own story in her own words, allowing each to share her experiences and perceptions that are unique to her. Semi-structured interviews were conducted such that each participant could engage in a narrative conversation with me. "The use of semi-structured intensive interviews has become the principal means by which feminists have sought to achieve the active involvement of their respondents in the construction of data about their lives" (Levesque-Lopman, 2000, p. 111). As mentioned in the theoretical framework, I have used my own personal and professional experiences in the field of science to analyze the experiences of those students majoring in science. While placing them at the forefront of my investigation, I have attempted to analyze their experiences through the feminist standpoint theory lens and construct knowledge from their perspectives in order to initiate social change within my institution.

Participants

The study took place at Waycross College, a two-year unit of the University System of Georgia located in rural southeast Georgia. The primary participants of my study were women students who were enrolled as science majors in the fall semester of 2005. Through the Office of Institutional Research, I obtained a list of these students. It was determined that seven women students were enrolled as first-year science majors for that semester. I used BANNER, the campus' computerized records system, to determine the class schedules of these students. I wrote a letter to each student personally requesting her to stop by my office at her convenience. I included my office hours and

all of my contact information if needed. Upon meeting with each student, I informed them of my study and requested their participation. All seven of the women students were willing to participate in the study and signed the research participant consent form.

Instrumentation

I composed an interview guide that consisted of a list of questions that I intended to ask each of the female students in my study. There were fourteen questions related to career choice that I asked each female student. Some of the questions were 1) What is your current major? 2) What are some reasons why you chose this major? 3) Describe the events that lead up to your choice of major? and 4) In what ways do parents, peers, and your significant other influence your career decisions? There were six additional items included on the interview guide that focused on demographical information for each of the women students. Some of these items were age, ethnicity, high school GPA, and parents' level of education. The complete interview guide is found in Appendix D of this research paper.

The interview questions were chosen to address the purpose of my study – *to investigate the lived experiences of first year female science majors at Waycross College, relevant to their career choices.* I chose questions that I thought would best reflect their experiences, both past and present, relevant to their career choices. I chose general, open-ended questions that I thought would allow the participants an opportunity to tell their stories without pressure to provide direct, definitive responses. I wanted the participants to share their experiences in a more conversational manner. The questions chosen enabled me to achieve my research goal and provide a voice for the women science majors at Waycross College. Although the interview instrument consisted of

fourteen questions, the interviews were open-ended and lasted from a half-hour to an hour each. The interview guide was approved by the Georgia Southern Universtiy Institutional Review Board (IRB) prior to the beginning of this study. A memo approving the use of human subjects at Waycross College was also obtained from Dr. Barbara Losty, the president of Waycross College at the time of this study. The memo was obtained per the request of the Georgia Southern University IRB. The Georgia Southern University IRB approval letter is included in Appendix A, and the Waycross College human subjects approval memo is included in Appendix B.

Data Collection

I concluded that two interview sessions, one during the fall semester of 2005 and one during the spring semester of 2006, should be conducted in order to gather enough data to achieve my research goal. Near the middle of each semester, I contacted each participant to arrange an interview session. Due to scheduling conflicts, some sessions had to be rescheduled. I interviewed six of the seven participants over a two-week span during the middle of fall and spring semesters. One participant who had initially agreed to be a part of the study was unable to be contacted for the interview sessions. Each session took place in a comfortable, neutral environment agreed upon by the participants and myself. Interview topics ranged from family and peer interactions regarding the participants' interest in science to specific on-campus experiences during their first year. Their experiences as shared through the interviews were tape recorded and later transcribed. All data was saved on a disc and kept confidential and secure in a locked cabinet in my office. All tape recordings and research consent forms were also placed

securely in the locked cabinet and will be destroyed one year after the conclusion of this study.

Summary

By utilizing the feminist standpoint approach, I aimed to maintain the accuracy and the integrity of the participants' experiences. Jayaratne and Stewart (1991) suggest "the ways in which research participants are treated and the care with which researchers attempt to represent the lived experiences of research participants are of…central concern" (p. 91). Therefore, no far-reaching generalizations were made when analyzing the qualitative data obtained from the interviews. As an advisor, I am utilizing the data gathered from this study to improve my personal interactions with my students and to encourage their participation and enthusiasm in a field that continues to push them away.

CHAPTER 4

RESULTS

Introduction

This chapter contains the results of the analysis of the data. This chapter has been divided into two parts. The first part reports the demographic data obtained from the interviews. I chose to provide an analysis of the demographic data first in order to establish a very general, characteristic portrait of this group of women science majors. The second part reports the qualitative data obtained from the interview questions relevant to the participants' career choices. This part is further divided into two sections, one that provides the voices of the six women and another that provides an analysis of what has been heard.

Examination of the Demographic Data

As previously discussed, several demographic items were addressed during the interview sessions. The following provides a summary of that data.

Age

During the first interview session, the students were asked to indicate their ages. Four out of the six were eighteen years of age, while the other two were nineteen years of age. Thus, the mean age of the participants in this study was 18.33. Based on Waycross College's classification standards, all participants were considered 'traditional' college students. There were no 'non-traditional' female science majors at Waycross College at the time in which this study was conducted and the average age of the student body population at Waycross College was twenty-one years of age.

Ethnicity

The women students were also asked to indicate their ethnicity during the interview sessions. Four of the students indicated that they were Caucasian, while two indicated they were Black. Thus, the female science majors at Waycross College were approximately 67% Caucasian and 33% Black at the time of this research study. The student body population as a whole consisted of 80% Caucasian, 17% Black and 2% Asian. The remaining 1% of the population consisted of students that were either Hispanic or Multi-racial.

High School Record

The participants were asked to indicate any high school math *and* science courses taken and their high school GPA. Responses were mixed. Two of the students indicated that they took simply the required courses without providing specific course names. The other four students specified that they had taken biology and chemistry, with one also having an anatomy course. Interestingly, only one student listed any math courses taken. In terms of high school GPA, five of the six students replied that their GPAs were either 4.0 or an 'A'. Some of these five students even indicated their exact high school numerical average and/or their graduating class rank. The remaining of the six participants replied simply that her GPA was 'good'. In comparison, the average high school GPA for the 199 beginning freshmen at Waycross College during fall of 2005 was calculated to be 3.0.

Income Status

Each participant was asked to indicate her family income status. Of the six participants, three characterized their families as belonging in the middle class, two were

characterized as belonging in the lower middle class, and one as belonging in the lower class. Students were not provided with an income status 'template' to refer to. They responded based on what they perceived as their income status 'category.' None of the students indicated a specific salary or income value for her family. While data regarding family income has not been solicited from the students at Waycross College, it is safe to conclude that the majority of the student population is from low income households. Waycross College serves an eight county area in rural South Georgia. The average per capita income for the Waycross College service area is below the average for Georgia. It was $19,197 in 2001 for the area, while the average for Georgia was $21,687. In addition, our financial aid office reported that over three-fourths of the student body received some type of financial aid, mostly need-based, in 2005 alone.

This data sets the stage for the qualitative data presented in the next section by providing some introductory demographics of the group of women involved in this study as well as the student population at Waycross College. While the participants were also asked to indicate their parents' levels of education, I have chosen not to include that information in this section. I found during the interview sessions that many of the participants made reference to this topic prior to being specifically asked this question. Therefore, I decided it would be better represented with the other interview question results.

Examination of the Qualitative Data

The qualitative data for my study was based on in-depth, tape-recorded interviews that were conducted in two separate interview sessions. The first session took place during the fall semester of 2005, and the second session took place during the spring

semester of 2006. Six female science majors participated in the interviews. These women shared their experiences, both inside and outside of the classroom, in relation to their career choices. Each of the six women was asked the same fourteen questions during each of the two interview sessions. At the conclusion of the sessions, their taped responses were transcribed, summarized and then analyzed.

Results of Interview Data for Females Interviewed

In order to maintain anonymity, I will introduce each female student participant in this study using a completely fictitious name. In addition, the results of the interview sessions will be presented for each participant with no regard to order. In each interview, I was interested in the first-year experiences of the participant relevant to her career choice. It was important to determine what was happening in the lives of these women as they began their college journey as science majors. Results of interview sessions are as follows.

Emily

Emily was an eighteen year old, black female from a lower to middle class income household when she began Waycross College. During the first interview session, Emily indicated that she was a pre-pharmacy major (biological science). She indicated that the main reason she chose this major was because she always wanted to know what types of medicines cured various diseases. She also stated that this type of field would produce a good salary as well. After completing her studies at Waycross College, she plans to complete pharmacy school in the state of Georgia. Although she is uncertain of the institution that she will be transferring to, she stressed the importance of the Hope Scholarship in this decision. Upon finishing pharmacy school, she plans to work close to

the Waycross area. Emily revealed that her initial interest in the medical field began in the tenth grade. She took a health occupations course that introduced her to the world of health care. This experience led her to take a Certified Nursing Assistant course through the local technical school. While she enjoyed the clinical experience at the nursing home and a local doctor's office, she felt that the salary for nurses was unsuitable. She knew that she wanted to be in the medical field and wanted to make a good salary, so she decided to explore pre-pharmacy.

Emily was asked to describe how she makes important life decisions. She stated, "I stress about it at first and then I like to research about it and see how things affect other people and ask around and then I make my decision." She indicated that her parents were the most influential to her and that they influence her in every way. Although neither of her parents graduated from high school, Emily described them as being 'supportive' of her educational goals. She commented that her friends have very little influence in her decision-making processes. She reiterated that the courses that she had taken prior to declaring her major also influenced her career choice.

Emily discussed her current experiences with her job at a local doctor's office. She noted the amount of support that she gets from the staff and the doctor. They constantly encourage her and ask her how classes are going. When asked about extracurricular activities, Emily replied that because of her job and her classes, there was no time for anything else. She added that she certainly would love to have the time to hang out with old high school friends and catch up on what is happening in their lives.

In terms of her campus experiences, Emily indicated that her classes were going well. In her description of the classes, she commented, "I like the mixture of older and

younger students. Everybody is grown and you do what you have to do. You don't have to be in a popular group." She noted a difference in social status between the high school and the college settings. In terms of her advising experiences, she remembered that her entire ninth grade class in high school had only one advisor for the entire class. She stated that her advisement at Waycross College thus far has been very good. She has appreciated having an advisor that has been readily available and has shown an interest in her goals.

Finally, Emily was asked to state her reasons for choosing to attend Waycross College. She replied that the small setting appealed to her. She wanted to go to a smaller college with small classes. For Emily, it was important for the instructors to know her name. She felt that she would be lost at a larger institution and that Waycross College would best prepare her for transfer to another institution. Emily added that she had been a part of the PREP program at Waycross College. PREP is a Post-Secondary Readiness Enrichment Program for local students who have the potential to attend college but for various reasons may not be encouraged to attend.

In the second interview session, Emily was still majoring in pre-pharmacy. Her professional plans for the future had not changed, and she continued to make important life decisions the same as before. She discussed the networking that was taking place with her classmates and her involvement in the Minority Advisement Program at Waycross College. She did note that while she had met new people on campus, they had no influence on her decisions regarding her career choices. Emily was enrolled in six classes and admitted that such a large course load was way too much. Although she did

make the dean's list for the previous semester, her plan was to take only four classes the following semester.

When asked about her advising experiences, Emily stated that her assigned campus advisor was very good. She stated, "He tells me which classes I need and how fast they fill up. He helps me plan out my schedule and prints it out for me." She also mentioned advice she received from a local pharmacist. He recommended various institutions for Emily to consider following her studies at Waycross College. Emily admitted that she was strongly considering transferring to Savannah because she could continue her studies in her chosen field at Savannah State University. She also noted that this location would allow her to continue receiving the Hope Scholarship and she could remain close to home. She concluded the interview session by pointing out the individualized attention and encouragement that she gets from her teachers.

Victoria

Victoria was an eighteen-year-old, Caucasian female from a middle income household when she began Waycross College. During the first interview session, Victoria indicated that she was a biological science major. She emphasized her lifelong love of animals. When she was in elementary school, she knew that she wanted to be a paleontologist. That passion then transformed into a desire to be an ecologist and then a biologist. During her summer vacations, as a hobby she wrote research papers on various animals. She pointed out that she really liked science and chose to be a biology major so that she could leave her options open in terms of her future interests in her educational journey.

When asked about her future plans, Victoria stated, “After I get done at Waycross College I would like to go to Texas A&M and study biology and after that I may decide to go to farrier school for horse showing just as a side job.” In terms of a career, she expressed her desire to work as a biologist at a fish and wildlife service. Victoria shared her love of animals and went on to say, “I have always liked to go to the zoo and I have livestock pets at home that includes four goats and a horse…so I would like to work with animals.” She was certain that while she loved animals, she did not have a desire to become a veterinarian. She felt that she could not handle working with sick animals. When Victoria was asked to explain how she makes such important life decisions, she replied that she gives it a lot of thought and prayer.

In terms of influential people in her life, Victoria first addressed her parents and their role in her career decisions. She noted that both of her parents have master’s degrees and that they do discuss her education with her. However, she argued, “I talk to them about it but if I want to do something and they tell me not to, if I want to then I do it anyway.” She then moved on to a discussion of an anatomy and physiology biology class that she had in high school. She noted that it was her favorite class ever and that her teacher was very inspiring to her and all of the other students as well. She spoke of the eight close knit friends that she had made in that class. She compared it to her current courses at Waycross College by saying,

> “In high school back when I was in AP biology there was only eight other people in my class so at first we really didn’t know each other but by the end of the year we became very close, a tight group of friends and we really supported each other

with our career choices. We are going to try to keep in touch and support each other. I don't feel that I really have the support here."

She described how she felt 'set apart' from the other students in the class. All of the other students in the class are nursing majors and assumed that Victoria was as well. She stated, "I don't have anything personally against nursing but I think it is kind of a mindless choice around here and I don't want it to sound bad but it is a major option around here." She concluded that she just did her own thing. She noted that the social hierarchy that existed in high school was not evident at the college level since students do not interact with classmates very much.

Victoria concluded with a discussion of her campus advisor. She said that he was very helpful and that she enjoys his ecology class because they have the same interests. She added that older friends who had already experienced college courses advised her on what and how many classes to take each semester. Victoria's interview ended with her reasons for choosing Waycross College. She said that she wanted to be close to home and that she was not quite ready to be out on her own financially.

Victoria's second interview session revealed that she was still a biological science major. However, she introduced a newfound interest that had her indecisive about her future. When describing her future, Victoria expressed an interest in working at the Jacksonville Zoo because of its close location to Waycross. Her focus, however, immediately turned to her new love, which was the art of belly dancing. She stated, "I have actually just started into belly dancing in December and now I love this so much that I want to open my own dance studio in Waycross and my biology is now just a crutch for my dance studio." At this point, belly dancing had become such a huge part of

Victoria's life that she no longer knew where she wanted to go to college or what her future would hold.

Victoria was asked to explain how she made important life decisions. She initially stated that she just talked about things with her family and friends. However, the conversation immediately reverted back to her decision to explore belly dancing professionally. She described the events leading up to her newfound interest, noting that she began belly dancing classes per the suggestion of a friend. Victoria also discussed how her confidence in herself had increased since she had begun the courses. She expressed a desire to go to San Francisco and study belly dancing from the woman who created her style of dancing. She recalled wanting to go to Texas A&M during the first interview session and seemed very uncertain as to where she would end up. She was torn between two worlds as she replied,

> "I thought why not just go to San Francisco and I could study biology at the university and study dance at the same time. And then I thought why don't I just go there and major in dance. And then I thought I don't have to major, I could just go there. It changes every day."

Victoria seemed very confused about her future but was extremely excited about belly dancing. Every question asked during the interview resulted in an answer regarding the dancing rather than her initial interest in biology.

When asked about influences in her life regarding her career decisions, she began by commenting on the support of her parents. While she claimed that her mom and dad supported her decisions, she stated,

> "I talked to my dad about a week ago about going to San Francisco and he told me it sounded like I was just trying to convince myself by telling him these things over and over but he supports me in whatever I want to do but I guess my family just thinks I need to keep going to college for biology first to support myself and the studio."

From her comments, it was obvious that Mom and Dad wanted her to complete her current studies and obtain a degree in biology before exploring the notion of opening a dance studio. She mentioned that other family members had issues with the belly dancing because of religious reasons. She expressed a lot of disappointment in the views of her family. Victoria also pointed out that she had started dating a guy who did not like to talk about the belly dancing. She said that he told her that he did not care for the music and that she talked about the belly dancing too much. She replied, "People don't understand how deeply it affects women who belly dance." She pointed out the amount of history behind belly dancing and the importance of its origin. Victoria added that the women in her belly dancing class had no influence on her decisions.

When asked about her campus experiences, Victoria mentioned that classmates were 'more interested' in her since they have found out that she belly dances. She even said that she and her friend won first place in the college talent show by belly dancing. In terms of her classes, she said that they were going fine, but that she was not learning much in some of them. Victoria then informed me that she had not spoken with her advisor since early in the previous semester. She went on to say that she might talk with him at a later time.

The interview session concluded with Victoria explaining why she chose Waycross College. She replied that at first she wanted to stay close to home. Although she still liked the area, she expressed concerns about remaining in Waycross because there were not many opportunities for her friends and her to belly dance. Victoria did discuss the possibility of continuing her studies at Waycross College and traveling to San Francisco during summer break to dance. Travel expenses were, of course, a concern for Victoria.

Hannah

Hannah was also an eighteen-year-old, Caucasian female from a middle income household when she began Waycross College. During the first interview session, Hannah indicated that while she was currently a computer programming major, she was changing to a history major because it was her true passion. When asked reasons for choosing her major, Hannah began by discussing her interest in graphic design that developed in high school. She stated, "I liked the idea of taking something that was nothing and making something from it." She noted certain areas of computer programming that she enjoyed and others that were not exciting to her. The more she thought about it, the more she realized what she would be doing eight hours a day. Hannah was even offered a scholarship to attend a graphic design school in Atlanta because of her interest in the field. At the end of her high school career, Hannah was diagnosed with a rare skin cancer which made her view things much differently than before. She realized that she should just live for the moment and that she should do whatever she wanted. Therefore, she changed her major from computer programming to history and began her own design business so that she could still pursue that passion on her own time.

Hannah described her experiences with history. She described the passion that a high school teacher had exhibited for teaching history. She stated, "I had a teacher who was so passionate about what she taught. Up until then I had hated history. But she got us into thinking of history as today. And she was so passionate that it made me excited." She even described a professor that she was taking at Waycross College that was inspiring in that field. These experiences made her desire to teach history grow stronger than ever. She did comment that she had no interest in pursuing a PhD in history at the time because she was anxious to teach and stated that she did not want to devote eight straight years to college.

Hannah was asked to describe influences in her life regarding her career choices. She indicated that while her dad was supportive in anything she wanted to accomplish, her mom was very hesitant to give the same support. Hannah described her mother's worrisome nature. She did not want Hannah to go away to school. She would have preferred her to stay home for a couple of years first. Granting her mother's request, Hannah chose to stay in Waycross and delay the scholarship opportunity. Hannah stated that her mother's worrying nature had been instilled in her as well. She explained how she worried about everything and how everything had to be planned out. Since the cancer, however, she stated that things were different. She no longer worried about long term plans or events. Instead, she said, "I am not focused on what I will be doing ten years from now but what I am doing now." She decided to live for the moment.

In terms of other influences in her life, Hannah talked about past boyfriends. She mentioned that a previous boyfriend supported her interest of graphic design. She talked about a stage of depression that she went through after their breakup. Once again, her

dad was very supportive while her mom pushed that she go to school no matter how sick Hannah was feeling. Hannah even reached a point that she believed there was no reason to do anything. A more recent boyfriend of Hannah's did not want her to go to school. He wanted her to quit school and get married. Of course, Hannah did not pursue that request. She did realize that her mother was simply worried about her and that her support was valuable. She also described the continued support that her sister and friends provided throughout her life.

Hannah concluded her interview session by sharing her campus experiences. She explained that the only class that caught her attention was her political science class. She also pointed out that her advisor had not helped her make up her mind. She made all of her decisions on her own regarding classes. She did not discuss any classmates or interaction with classmates during the interview. Hannah did indicate that both of her parents graduated from high school.

During the second interview session, Hannah indicated that she was still a history major and that she planned to transfer to Valdosta. After that, she plans to complete her last two years of study at Georgia Southern University. She indicated that she planned to have a family, teach history and possibly teach karate as well. She also indicated that while a former desire to pursue the field of math and science was no longer existent, she still chose to take math courses as electives. Hannah explained that her family and her current boyfriend were supportive of her and that they just wanted her to be happy. She also revealed that she has a passion for karate. She commented on how it had increased her confidence and made her feel more independent.

Regarding her campus experiences, Hannah had not been to an advisor. She was still registering herself for classes. She indicated her displeasure with her current history professor. As strong as Hannah's desire was for history, she stated, "My current history teacher makes me want to shoot myself in the foot." She noted that the teacher was very boring and the course was a very discouraging experience. Hannah realized that she could endure the course in order to continue reaching her career goals.

Monica

Monica was a nineteen-year-old, Caucasian female from a low income household when she began Waycross College. During the first interview session, Monica indicated that she was a biological science major and that she planned to pursue a career in occupational therapy. She explained the main reason for choosing this major revolved around an accident that her mother was in during the late 70s. She stated that her major was in honor of her mom and all of the therapy that she had received. Monica indicated her desire to go to Valdosta State University to complete her four-year degree and then transfer to the Medical College of Georgia for further study. She also expressed a desire to open her own occupational therapy business someday in Charleston, S.C.

Regarding events that led up to her career decisions, Monica stated, "I am a very religious person and I had a dream that I should go into occupational therapy, so I decided to give it a try." She described her self-discipline and motivation as key components for obtaining her goals. She noted that her mother was by far her greatest influence. Her father passed away when she was seven and her mother raised Monica while bound to a wheelchair. She did note her father's influence although he was not present. Monica also mentioned that her current boyfriend encouraged her to follow her

dreams. She pointed out that she frequently wonders if she will be able to be far away from him when she transfers.

Monica was asked to discuss her campus experiences. She described her classmates as helpful and friendly. She noted how they help one another in classes. In terms of advising, Monica said, “My college advisor didn’t help me out much. He just helped me with the core classes I need. I haven’t really talked with my advisor.” She explained that she had planned initially to attend Valdosta State University instead of Waycross College, but she changed her mind due to her mother’s medical condition. She went on to say that now that she is at Waycross College, she enjoys it and will complete her two-year degree. Monica also wanted to be able to save money. She added that her mother received her GED and has had some college courses.

During the second interview session, Monica stated that she was still a biology science major. Monica proceeded to answer the interview questions almost identically to those answers that she provided in the first session. She described the same future plans and her mom’s influences just as before. She stated that she was enjoying her classes but that her advisor had not helped her. She said, “My assigned advisor never told me about one class I will need but another one did. My advisor didn’t really help me. I have to trust myself and talk to other advisors.” Monica talked about her job at a local pharmacy. Her boss told her that she was ‘not living up to her potential’ and that she should not pursue a career just because of her mother’s condition. She noted that the boss was a ‘male chauvinist pig’ and that the work environment was very stressful, so she decided to quit. After quitting her job, she noticed a huge increase in her classroom performance.

Ashley

Ashley was a nineteen-year-old, black female from a middle income household when she began Waycross College. During the first interview session, Ashley indicated that she was majoring in pre-engineering and that she wanted to be a biomedical engineer. She noted that she wanted to get her doctorate degree, live in Atlanta, and make lots of money. When asked what events led up to her career decisions, she described an advertisement that she had seen on television just prior to fall semester. She stated, "I wanted to be a Chiropractor before this. After hearing the pay scale, I didn't want to go to school for that small pay." She went on to say that she planned to make 'around $100,000 a year' as an engineer. Ashley was adamant that salary was the major reason for choosing the engineering field.

Ashley was asked to elaborate on how she made important life decisions. She replied that she talked to her mother and people in her chosen field before she makes a decision. In terms of her influences, she commented that everyone around her, including family and friends, all influenced and supported all of her decisions. She had no extracurricular activities to discuss because she worked a full-time job and had no time for anything else other than school. Ashley noted that she had to work because she had a large car payment that she had to make on a monthly basis.

In terms of her campus experiences, Ashley stated that her full-time course load was going well. She did not discuss any interactions with friends or classmates. Regarding her advisor, Ashley noted that she had never spoken to one at the college.

During the second interview session, Ashley was not enrolled in classes but was planning to return during the summer. She indicated that her major had changed to

nursing. When confronted about the potential salary differences among nurses and engineers, Ashley commented that she did not want to become a registered nurse or a licensed practical nurse like her mom. Instead, Ashley had decided to pursue a career as a nurse anesthetist. When asked what influenced her to make such a change, she replied, "I have a friend who is going to do it and now I have another friend who is interested, so it seems interesting." She went on to say that she makes decisions based on opinions of those that have experience in those areas.

Ashley proceeded to talk about the influences in her life. She stated that she still had the influence and support of her friends and family. When asked if there were any other factors that influenced her decision to change to nursing, she replied,

> "I haven't really researched it here but I will get into the two-year program here and by then that will help me get a better idea of what I want to do. I wanted to be an RN but a nursing anesthetist pays real good and that is what I want to do. Before surgery the nurse anesthetist puts people to sleep and I think I will like being in surgery doing this. Their job is similar to an anesthesiologist."

She added that she had not officially changed her major yet and that she has not spoken to an advisor. She is still certain, however, that her new major is exactly what she wants to pursue in life. Ashley was still working full time at a job unrelated to her chosen field. She emphasized her desire to work in an environment related to nursing.

Jessica

Jessica was an eighteen-year-old, Caucasian female from a lower middle income household when she began Waycross College. During the first interview session, Jessica indicated that she was a biological science major interested in pursuing a career in

veterinary medicine. With hesitation, she added that she was also considering the field of pediatrics. While in high school, Jessica had the opportunity to work at an animal clinic and had a very supportive boss. She explained how this had been her goal for as long as she could remember. Jessica loved working with animals. Regarding her future career aspirations, Jessica plans to complete veterinary school at the University of Georgia. She would like to open a private practice, giving her the opportunity to live and work in Waycross.

Jessica went on to explain how she made important life decisions. She revealed that she considered the feelings of her mother and her boyfriend. She stated that she had witnessed what her parents had given up financially for marriage and now they are divorced. Her dad graduated from high school and her mother obtained her GED. After watching her mother worry about finances, Jessica was certain that she wanted a profession where money was not a problem. She also said that both of her parents were supportive of her going to college. Jessica commented, "They both want me to better myself." In terms of her boyfriend, Jessica said that he was very supportive as well and that it was difficult for her to make the decision to transfer out of town. Other influences in Jessica's life included her boss at the animal clinic and her work-study high school teacher. They both supported her career decisions and provided encouragement in Jessica's pursuit of a college degree.

Jessica was asked to describe her academic experiences. She pointed out that she really enjoyed all areas of math and science. She indicated that her courses and advising were going well and that her teachers were really good. She added that her high school counselor introduced her to lots of career options and scholarship opportunities.

Although her classes and her job keep her extremely busy, Jessica said that she makes time to enjoy breeding yellow labs and playing sports like softball and baseball. The interview closed with Jessica's reasons for choosing Waycross College. She stated, "I heard that Waycross College was really hard and that if I can make it here, I can make it anywhere. Most colleges respect Waycross College's reputation." She added that she did not have to drive very far to campus and it was an opportunity to save gas.

During her second interview session, little had changed for Jessica. She stated that she was still a biological science major and that she planned to become a veterinarian. She also stated that her transfer institution would be the University of Georgia. She did note additional support from her current boss at the animal clinic. When asked how others influence her career decisions, she stated, "I just make up my mind about what I want to do and if they support me fine, if not then I do what I want to." Jessica added that there was no longer a boyfriend to consider in her decisions.

Regarding her advisor, Jessica mentioned that he had printed out a list of courses that she would need in her degree program. She then took the list and decided for herself what she needed to complete the necessary requirements at Waycross College. Jessica added that she did not have much interaction with classmates or teachers. She did stress how interesting her classes were because of the teachers and that she enjoyed going to classes.

Summation of Qualitative Data

After gathering the interview data from the six students, I began to summarize the data. I began by placing the data in a summation chart that was created to map out the results of the interview questions. The chart, located in Appendix F, allowed me to

examine the responses of the participants as a whole for each of the interview questions asked during the two interview sessions. Similarities and differences in the participants' responses were more easily identified by using the summation chart. The following is the collective summary of the data.

During the first session, the participants began by indicating their majors. The table below summarizes their responses along with their career aspirations associated with their majors.

Table 1

Session One Majors and Career Aspirations

Participant	**Major**	**Career Aspiration**
Emily	Biological Sciences	Pharmacist
Victoria	Biology	Biologist
Hannah	Computer Programming	History Teacher
Monica	Biology	Occupational Therapy
Ashley	Pre-Engineering	Biomedical Engineer
Jessica	Biology	Veterinarian

Five of the six participants were certain of the career choices in the sciences at the time of the first interview session. Hannah was in transition with her major decision. She was declared a computer programming major, but was fairly certain that history was her true

passion. When asked why they had chosen their majors, the responses varied. Two of the participants connected their decisions to job experience. Emily had worked at a doctor's office and a local pharmacy while Jessica was assisting at an animal clinic. Two other participants, Victoria and Hannah, indicated a 'passion' for their chosen majors. Victoria has always loved learning about animals, while Hannah has enjoyed creating her own graphic designs. Recall, however, that Hannah is considering changing her major to history because she enjoys listening to and learning from historical accounts more so than sitting in front of a computer all day so that someone else can critique her efforts. Monica's career decisions were based solely on her mother's experiences. She hopes to be a person who can make a difference in someone's life as others have for her mom. Finally, Ashley was clear that the salary was the driving force in making her decision. While Jessica's major reason for wanting to be a veterinarian was her experience with animals, she too mentioned that salary was important.

All of the participants then stated their future plans. Three of the six participants indicated that they wanted to live and work in the Waycross area. Emily wants to be a pharmacist in Waycross, Hannah would like to teach in the area, and Jessica wishes to open her own local animal clinic. The remaining three participants hope to work outside of the Waycross area. Monica wants to start her occupational therapy center in Charleston, South Carolina. Victoria hopes to work at the Jacksonville Zoo or the local wildlife center, while Ashley plans to work as an engineer in Atlanta.

Regarding how participants made important life decisions, responses were mixed. Ashley based her decisions on experiences shared by others in her chosen field, while Monica and Jessica considered their mothers' feelings. For Jessica, the feelings of her

boyfriend were also a consideration when she made decisions. Hannah did end up pursuing her mother's wishes but insisted that her life decisions were passion-driven. Religion was a means of decision making for both Victoria and Monica. They referenced dreams and prayers. Finally, Emily gave a more thorough response. She actually described the process which she executed when making important life decisions.

The first interview session also explored the participants' influences in terms of their career decisions. They were asked to address parents, peers, significant others, and any additional influences in their lives. The following table summarizes their responses from the first interview session.

Table 2

Session One Career Decision Influences

Participant	**Parents**	**Peers**	**Significant Other**	**Other Influences**
Emily	Most influential Supportive	Very little	Not mentioned	High school experiences
Victoria	Informs them but makes own decisions	Not mentioned	Not mentioned	High school experiences
Hannah	Supportive father	Not mentioned	Opinions were not influential	High school teacher
Monica	Mother most influential	Not mentioned	Not mentioned	Not mentioned
Ashley	Influential	Influential	Influential	Career Salary
Jessica	Supportive parents	Not mentioned	Strong influence	Not mentioned

All participants indicated some form of parental support, either from the father, the mother, or both parents. Only two of the women mentioned the influences of peers. However, neither of them offered specifics such as names or events. Five of the six participants did not indicate influences of a significant other in their career decisions while the remaining one participant, Jessica, did. She made it clear that her boyfriend's feelings were a consideration when planning her future. Half of the participants noted

high school teachers or classes as an influential aspect in their decision-making processes.

During the second interview session, all of the participants indicated their majors and career aspirations. The following table summarizes their responses.

Table 3

Session Two Majors and Career Aspirations

Participant	**Major**	**Career Aspiration**
Emily	Biological Sciences	Pharmacist
Victoria	Biology	Biologist and/or Belly Dancer
Hannah	History	History Teacher
Monica	Biology	Occupational Therapy
Ashley	Nursing	Nurse Anesthetist
Jessica	Biological Sciences	Veterinarian

Only two of the participants had changed their majors since the first interview session. Hannah had dealt with any conflicting emotions that she had had regarding her interests in graphic design and history. She had decided to declare history as her major. She expressed a great deal of certainty in her decision although she did not like her current history professor at all. Ashley had changed her major as well. While her latest decision was still in the medical field, her newfound interest was very different from her initial

desire. During the second interview session, Ashley noted that she was no longer interested in becoming a biomedical engineer. She was now interested in becoming a nurse anesthetist. When asked why she changed her major, she commented that her friends were telling her how great it would be and how much money a person in that type of career earned.

During the second interview session, all of the other participants indicated the same career aspirations except for one. Victoria, who seemed to be the most certain about her future in the first interview, was more confused about her career decisions than any of the others. As previously discussed, Victoria was now interested in belly dancing. She enjoyed this new passion so much that she viewed it as a potential career. She was even considering giving up her pursuit of a degree in biology in order to perform professionally as a belly dancer.

In terms of how the participants made important life decisions, only two of the participants had altered their responses. Victoria indicated that she had been soliciting the advice of family and friends in order to help her reach a decision about her future. Jessica noted that she no longer considers the opinions of others as she did in the first interview session. She decided that her own desires and feelings were the only considerations regarding her career goals. She added that she no longer had a boyfriend influencing her choices. The other participants were again asked to discuss the influences in their lives regarding their career decisions. The table that follows summarizes their responses from the second interview session.

Table 4

Session Two Career Decision Influences

Participant	**Parents**	**Peers**	**Significant Other**	**Other Influences**
Emily	Most influential Supportive	No support provided by friends	Not mentioned	College extracurricular activities
Victoria	Informs them but makes own decisions	Support belly dancing	Supports major but not belly dancing	Classmates talk about belly dancing
Hannah	Both parents	No support	Supportive	Instructor is negative influence
Monica	Mother most influential	Not mentioned	Not mentioned	Negative work experience
Ashley	Influential	Influential	Influential	Career Salary
Jessica	Supportive parents	Not mentioned	Not an influence	Career Salary

From the table it is evident that there was a 'shift' in the sources of influence among several of the participants. Along with the change in boyfriend status, Jessica indicated that the potential career salary for veterinarians was a big influence in her career decisions. Emily described an absence of influence from friends. However, she commented on her involvement with campus organizations and the support and encouragement that they have provided for her. For Victoria, the influence of her parents

had not changed. She did, however, admit that her friends and classmates now acknowledge her because of the belly dancing. She stressed the great amount of encouragement that her friends have provided as she pursues belly dancing. Victoria added that while her boyfriend does not like to discuss the belly dancing, she continues to seriously consider it as a career. Hannah's current boyfriend, however, is very supportive of her career decisions. For the remaining two participants, Monica and Ashley, nothing had changed between interview sessions in terms of the influences in their lives.

Thus far in the analysis of the interview sessions, I have failed to mention the advising experiences of the participants. I wanted to examine the responses of the participants for both sessions simultaneously in order to get a better perspective on how those experiences may have changed throughout their first year. Those experiences are indicated in the following table.

Table 5

Session One and Two Advising Experiences

Participant	**Advising First Session**	**Advising Second Session**
Emily	Very Good	Very Good
Victoria	Helpful – Advising specialized in her area of interest	No contact
Hannah	No contact	No contact
Monica	Not much help	Went to other advisors
Ashley	No contact	No contact
Jessica	Good	Very little interaction

It is important to note that students were assigned to advisors based on their declared major when they were admitted to Waycross College. Since all of these students were science majors, they were all assigned to a science advisor. At the time of the interview sessions, Waycross College had three male advisors that assisted science majors. They were assigned advisees based on the emphasis areas chosen by the students. I was not an advisor for science majors and therefore did not have any of the participants assigned to me for advising.

During the first interview session, only half of the participants indicated a positive advising experience. The remaining participants did not have a positive experience. Monica stated that her advisor simply signed her up for classes but was not much help in 'advising' her about her chosen field or future classes and programs. Hannah and Ashley

indicated that they had not even met with an advisor to discuss their courses or their majors. By the time the second interview session took place, all but one of the participants had negative responses regarding their advising experiences. Those five participants indicated little or no contact with an advisor. One of them argued that since she received little help in the fall semester, she got assistance from another advisor outside of the science arena. Emily was the only participant that had had a positive advising experience during her second interview session. Recall that Emily was active in organizations on campus, including the Minority Advisement Program. Through this program, Emily received additional advising and support regarding her career choices along with the information provided to her by her assigned advisor.

It is evident that all of the participants' experiences did undergo some changes throughout the year. Some participants gained new sources of encouragement and support while others did not. Some of the influences that the participants indicated during the first interview session simply shifted sources once the second session was held. At the discretion of the researcher, some very personal accounts were deemed unbeneficial data for this study and were therefore omitted from this analysis.

Analysis of Qualitative Data

By summarizing the data, I was able to get a better handle on who the participants were as female science majors in the first year of study. In order to understand them as individual young women, I chose to analyze each one of them separately as well.

Emily seemed very determined about her career choice throughout the entire interview process. While very timid in nature, Emily was very open regarding her plans. She was heavily dependent upon her parents' opinions regarding her decisions about life.

While they were noted as the most influential in her life, she did not indicate any discussions with them regarding her career choices. It seemed as though while there was a system in place supporting her decision to go to college, there was a lack of influence regarding her future plans. Emily was the only participant to indicate any participation in campus opportunities. She mentioned her involvement in the campus assistance program for minority students and seemed to view it as a means of 'belonging' or being a part of something on campus that made her feel included. Interestingly, however, Emily did not reflect on any influences from fellow students, peers, or a significant other. Her comments on advising seemed positive while in reality, she really did not have a basis of comparison from high school. She commented on the number of students that one advisor must accommodate in her high school. Thus, very little one-on-one advising, if any, was experienced prior to college. As she discussed her college advising experiences with me, I instantly knew that she was not getting the career counseling aspect that should accompany the experience. She was simply going through the motions of getting a class schedule and not revisiting her advisor for further career discussions. Because of her high school experiences, she had no idea that her advising experience should have involved more than just getting a course schedule.

Victoria seemed very certain about her career decisions at first but went through a major transitional stage during her first year. I concluded that she had been living in an academic shell with no access to social activities. Once beginning Waycross College, she was exposed to social activities, which seemed to conflict with her predetermined career goals. Perhaps she went in search of a 'network of friends' that she no longer had from high school. Since her classes and her choice of major did not offer her access to such a

network, the exposure to belly dancing became her new access to the uniformity that she once felt. While the belly dancing was nonacademic, it certainly was fulfilling to Victoria, as it exposed her to a more sociable side of life and made her more confident in herself outside of the academic arena. Belly dancing was so influential, in fact, that she viewed it as a potential career option. Victoria consistently commented on the influence of family but was adamant that she made her own decisions regardless of the opinions of others. While there was no mention of a boyfriend in the first interview session, Victoria did make it clear during the second interview session that her current boyfriend did not show an interest in the belly dancing. She was determined to embrace this newfound passion regardless of her boyfriend's feelings, however. Victoria, although understandably confused about her career goals, remained a bit too sure of herself to make such important life decisions.

Hannah, now a history major, argued that she changed her major because of her passion for the subject. While conducting the interview sessions, Hannah exhibited a very independent persona regarding her career choices and stated that her decisions were based on passion. After analyzing the interviews, however, it seems as though many of her choices were strongly influenced by the presence of a boyfriend. I believe that she realized that a career in graphic design would interfere with the heteronormative lifestyle to which she had been led to conform. As a history teacher, her schedule would permit her to get married and raise a family. This notion was certainly more evident in the second interview session. Hannah was able to satisfy her independent persona by staying in school, against her boyfriend's desire, and choosing karate as a hobby. With appropriate guidance, Hannah could have been told that graphic design could prove to be

a fulfilling and family-friendly career. Geographically, however, Hannah was not ready to move away from the opportunity to get married and have a family in order to pursue such a career.

Monica was the most headstrong in the group. She has encountered many obstacles throughout her life and was forced to mature much earlier than her peers. Because her mother was bound to a wheelchair for most of Monica's life and income was scarce, Monica was forced to grow up in a hurry. She understands what it is like not to have material things and the effort and dedication required to obtain them. In terms of academics, Monica knows what she wants and is highly capable of obtaining her goals. While her college advisor was not helpful in planning her career, she was 'advised' by life events. Her life experiences prior to college helped her map out her future. Monica did discuss her boyfriend and his continued support of her career aspirations. Although she fears that she will miss him when she transfers, I believe she will continue on her career track and complete her education without letting relationship commitments like marriage become a priority. I do believe that her mother's health could certainly alter her current plans should her condition deteriorate as Monica continues her chosen path.

Ashley's career aspirations were completely salary driven. While uncertainty is anticipated for any young student considering her future, Ashley was only considering the amount of money that she could potentially earn in her chosen fields of study. She began the year aspiring to be a biomedical engineer and then transitioned to wanting to become a nurse anesthetist. In both cases, it was evident that Ashley had no idea of what these careers really entail. She was simply choosing fields of study based on what she had heard from the media and her friends regarding the potential salaries associated with

those fields. While salary is certainly an important component to consider when setting career goals, other factors such as job expectations, interest in the field, and academic credentials required should also be considered. Ashley mentioned the presence of a much older boyfriend and the support that he provides. Without a sincere interest in the chosen field for reasons other than salary and considering the lack of career counseling, I do not expect Ashley to return to college.

In her first interview, Jessica was adamant that her boyfriend played a role in her decision making. With him no longer in the picture at the time of the second interview session, Jessica seemed more independent regarding her career choices. However, it was obvious that were she to engage in a future serious relationship, her decisions might once again be influenced by her partner. The influence of such a partner may be greater at this point since she no longer has a counselor assisting her with her career options as she did in high school. Jessica seemed to lack any type of connectedness with peers who could possibly offer their support. I suspect that her previous relationship, given its serious nature, did not allow Jessica many opportunities to maintain friendships with peers. Luckily, through her current job, Jessica seems to have a good support system and she is getting lots of valuable experience in her chosen field.

CHAPTER 5

DISCUSSION OF RESEARCH FINDINGS AND IMPLICATIONS

Introduction

This study was designed to investigate the lived experiences of female science majors during their first year at Waycross College. Even though the number of females majoring in science at Waycross College has slowly increased, females are still underrepresented in this field of study. Across the nation, more males are earning science degrees, obtaining higher paying jobs, being retained in these areas, and being promoted to greater positions of power compared to women. Therefore, from the viewpoint of feminist standpoint theory, women majoring in science have continued to be neglected in terms of support, encouragement, and advisement at their chosen institutions. Many women science majors at the two-year college level may lack the training and education needed in order to make sound career decisions. They may view themselves as 'just another major' like their non-science counterparts without even realizing the uniqueness of their status and the external and internal influences that accompany that status. How can their experiences be made more obvious to them and how can those experiences improve?

Discussion of Research Findings

This research study has been grounded in feminist standpoint theory, which has allowed me to understand the experiences of the women participants. They were able to share their stories as young women and share their perspectives relative to their chosen fields of study. The review of literature in this study included nationally published data

and other related studies whose findings showed that women majoring in science are still disadvantaged and are not equally represented in the science fields compared to men (NCES, 2001). These findings continue to make it difficult for the voices of women in pursuit of a science career to be heard. Without a voice, these women will continue to have experiences similar to my own, and women will continue to be underrepresented in the field. This study has shown that women are continuing to have experiences similar to those I had fifteen years ago. They are not being taught how to make career decisions. These young women are still not getting the encouragement and support necessary for them to be successful in what continues to be a male-dominated field. In keeping with feminist standpoint theory, I listened carefully to the stories shared by these women and began an analysis of their career choices, the influences that surround their choices, as well as their perceptions of their own potential as science majors. Through qualitative data collected during interviews of the women in my study, feminist standpoint theory allowed me to better understand their first-year experiences, which in many instances, as discussed below, reflected the research studies included in the review of literature.

The analysis of the interviews revealed several emerging themes. First, all of the participants indicated some form of parental support throughout the duration of the study. They all indicated that one or both parents were a constant resource for encouragement in their career pursuits. Second, the influence of boyfriends played a significant role in the decision-making processes of the participants. Third, most of the participants revealed either negative advising experiences or no advising experiences at all. There was certainly an obvious decline in the quality of the advising experiences for all of the participants. Last, the analysis of the interviews revealed that the participants felt no

connection to or within their chosen majors. There was an absence of mentoring programs, friendship networks in the classes, and social or organizational opportunities that could prove advantageous in improving the experiences of women majoring in the sciences.

The first emerging theme, the constant presence of parental support, was indicated in my study and addressed in the review of literature as well. Although Teidemann's 2000 study revealed that a significant number of parents perceive boys are more competent in science than girls, Gavin (1996) and Monhardt, Tillotson & Veronesi (1999) concluded that parents are considered a major influence in both male and female interests in the sciences. Although his study included all majors, both science and non-science, Scanlon's 1994 study of undergraduate women also found that parents were very influential in women's career commitments. All of the women participants in my study indicated that one or both parents were supportive of their career decisions as well. Hannah, who was changing her major to one that was not in the sciences, was the only participant to share that her mother was against her going away to school to pursue her prior science interest. Thus, there is a possible correlation between Hannah's change in major and her mother's lack of support. Hollenshead, Yonce, & Wenzel (1994) indicated that women need encouragement from family in order to be retained in science programs.

Interestingly, however, none of the participants in my study provided detailed accounts about conversations with their parents regarding their career choices, and none of them were 'following in the footsteps' of their parents. While they indicated that their parents were a constant means of encouragement, they did not tell any stories of parental support in career choice. It is quite possible that their parents, like mine, were simply

happy that the girls were in college and had little concern for what they were majoring in at such an early stage in their postsecondary education. The participants provided specifics only on those forms of encouragement that no longer existed, such as peer groups and prior classroom experiences in their high schools.

Victoria, for example, declared that she missed the 'close knit' relationship that she had had with her science classmates in high school. She no longer had the peer group to collaborate with at Waycross College. She even noted the isolated feeling that she had in her college science course because of her chosen major. I could certainly relate to such emotions because of the isolation that I encountered in my course when I was a science major. The lack of peer support in my classes was one of the reasons that I chose not to attend Georgia Tech. According to Seymour & Hewitt (1997), women students are discouraged from pursuing their science interests by peers who label them as weird or asocial. Their study investigated reasons why women chose to leave the science field. Recall that Victoria was the most certain of her plans during the first interview session but was the most confused about her career interests by the time the second interview was held. Other studies, like Davis, Ginorio, Hollenshead, Lazurus, & Raymond (1996) and Sax (1994), argue that such forms of discouragement disappear as the percentage of women in the major increases. Research shows that women are more likely to persist in a science major if they are surrounded by other female peers in that science field (Sax, 1994). If more women were majoring in the sciences today, would Victoria have had a more positive experience in her college science class? Would there be others majoring in the same field that could collaborate with and support one another?

The second theme that emerged in my study was the influence of boyfriends. Although the role of boyfriends was not reflected in the review of literature, all but one of the participants in my study mentioned the presence of a boyfriend in one or both of the interview sessions. Hannah in particular discussed her complete background with boyfriends. In high school, one separation from a boyfriend pushed her into a stage of depression. After mentally recovering from that break up, Hannah dated a guy who wanted her to quit school and get married. While she did not honor his wishes and later ended the relationship, Hannah did change her major from a science field and decided to stay close to home and pursue a career in history education. While I believe her mother to be a major influence in pushing Hannah to make such a decision, Hannah was also influenced by the idea of getting married and having a family. Her experiences with boyfriends had set the tone for what was expected of her. Although this heteronormative expectation did play a key role in Hannah's decision-making processes, she still wanted an education and a career. Research studies (Rosser & Lane, 2002; Subotnik, Stone, & Steiner, 2001) have indicated that females regarded family obligations and time management as major challenges within their careers. By changing from science to education, Hannah was able to design her career goals around the idea of a husband and a family. She commented that as a teacher she would have a more suitable schedule for managing a marriage and a family someday.

The remaining participants in my study that indicated the presence of a boyfriend did not provide background information like Hannah. Most of them simply commented that their boyfriends were supportive of their career choice. Through the interviews, however, the heteronormative expectation that society has reflected upon them did seem

to play a key role in their choices. Jessica, for example, made it clear that her boyfriend was a major influence in her career decisions. While she seemed to have totally erased him from her life at the time of the second interview, I believe that her next relationship will also influence her choices. Emily was the only participant not to indicate the presence of a boyfriend. Given the experiences of the other participants and the heteronormative expectations of society, I am sure that a relationship with a significant other was presupposed. Emily just had not encountered that stage of her life. Thus, the influence of a significant other was not yet a part of her decision-making processes.

The third theme that emerged in my study related to the participants' advising experiences. Throughout the first year, the participants indicated a decline in the quality of their advising experiences. The review of literature revealed very little findings regarding advising experiences at the collegiate level. One study, however, did interview a group of women college students and found that their advisors did not provide the women with career information and no vocational personality assessments were given (Olsen, 1993). Most of the participants in Olsen's study, in fact, admitted that their career decisions had been reflective of what others told them they should do. Similar to Olsen's finding, several of my participants shared the same experiences. None of the women in my study was provided career information. In fact, only one participant was still going to her assigned advisor to get registered for classes. With the end of the first year approaching, the women in my study indicated that no discussions regarding career interests took place between them and their advisors.

While the advising processes at Waycross College have seemed very grim, I must clarify the role of advisors at the time of this study. Once students were assigned to an

advisor, they were recommended to make an appointment with him/her to discuss their schedules. Advisors were expected to determine what courses best suited the students, explain to them how to use Banner, discuss their plans in terms of transferring to a four-year institution, discuss their career goals, and physically register them in the computer, all within a thirty-minute appointment. Unfortunately, in many cases, advisors simply did not have enough time to cover all of this information. Thus, advisors and advisees were encouraged to make an initial appointment for scheduling purposes only and then schedule a follow-up appointment to discuss transfer options and career goals. As experience has proven, the students typically never returned for follow-up appointments once they believed that they were capable of choosing their own schedules and registering themselves through the Banner system. It is important to note that faculty members are assigned to advise approximately twenty-seventy students each in addition to their normal faculty responsibilities without receiving additional pay or incentives. Furthermore, because of the size of our institution and limited funds, a career center is not an immediate option for the students.

No other research studies in the review of literature addressed the role of advisors for female science majors. However, other studies offered alternate advising options. Through these ideas and programs, females have had positive 'advising' experiences at other levels of education. Clewell, Anderson, and Thorpe (1992) found that these various programs have 'advised' female students to use mathematics and science in the home and 'advised' them to join science and mathematics clubs in order to become more familiar with career counseling opportunities, guest speakers, field trips, competitions, and projects, all of which were connected to science. Unfortunately, these projects that

involved some form of advising students prior to going to college and were not carried through to science careers.

A fourth theme that emerged from the analysis revealed that the participants felt no connection to or within their chosen majors. While the review of literature addressed a need for strategies for improving the status of women in sciences, this research study revealed that the participants did not have a sense of 'belonging' to the field of science. As previously stated, there was an absence of mentoring programs, friendship networks in the classes, and social or organizational opportunities that could prove advantageous in improving the experiences of women majoring in the sciences. The participants indicated areas and opportunities for associations on campus, some of which reflect those suggested in the literature review. Victoria, for example, missed the support group that she had had in high school. She revealed negative college classroom experiences that made her feel detached from the others in her class who were all nursing majors. Some type of support group formed for females majoring in the sciences may create a more comfortable, non-isolating environment.

Some of the participants indicated various instances when a particular person impacted their lives. Because of the impact they made, they were portrayed as 'mentors' for these participants. Unfortunately, as the participants have progressed to the next phase of their education, their 'mentors' may no longer be accessible to them. Thus, a mentoring program was an unsolicited suggestion as a means for improving their experiences about their majors, their courses, and their futures. Several of the initiatives, including operation SMART and Women in Engineering, discussed in the review of literature credited mentoring as an effective tool for a successful program. A mentor

would also serve as an ‘ear’ to listen to these women and their experiences and offer encouragement and information that could lead to successful and fulfilling career decisions.

The last and most notable way to establish a connectedness between the participants and their majors is through ‘quality’ advising. At Waycross College, the role of the advisor is not only to register students and print them out a schedule, but to inform students of their future options based on their chosen fields of study. Unfortunately, the participants in my study did not get this form of advising. Their experiences should have involved course planning and career counseling. Because many institutions and programs frequently change their requirements, these students should be encouraged to meet with their advisors on a regular basis to discuss their educational options. The advisement program that was in place at the time of this study failed these women miserably.

Implications

The results of this study are of importance to advisors of female science majors because they can better understand the type of encouragement these young women need to receive as they pursue a degree in science. Advisors can recognize the need for additional inquiry into the interests of female science majors and, at the very least, prompt them to stress the importance of a follow-up appointment to discuss career plans. Science instructors could utilize the results of this study by recognizing that these young girls need to feel a connection to their chosen fields. Within a classroom environment, they could attempt to ensure a more comfortable atmosphere that does not promote a divide among various majors, specifically a divide among science and non-science

majors. Administrators could take advantage of the results of this study by identifying opportunities for improving the current status of women in science fields. Providing students with additional programs or incentives that may improve their college experiences may also increase retention of students.

Most importantly, the results of this study could benefit female science majors. By reading the stories of the participants in this study, other female science majors may get a better understanding of the experiences that surround a woman declaring science as a major. From the experiences of the women in this study, they could possibly learn what to expect in their courses, in advising, and in relationships with family and friends. The research surrounding females in the sciences may help them realize the uniqueness of their status and make them more aware of the challenges they may encounter as they pursue their career choices.

Recommendations

Although much research has been conducted to investigate women in the sciences, there are additional areas that remain to be explored. First, because of the continued underrepresentation of women, more exploration of females in the sciences needs to be done at all levels of education. At the collegiate level, I would recommend research that follows female science majors beyond the transfer process from the two-year college level to the four-year college or university. Second, it would be beneficial to investigate how the transition may affect their career choices and determine ways to make the transition a positive experience. Third, I would recommend an analysis that compares the experiences of males and females majoring in science.

At Waycross College, I recommend several opportunities for improving the experiences of all students. First, I recommend the addition of a registration and career counseling center. The center could be operated by full-time, trained staff whose responsibilities would include registering and advising students. They could handle all registration processes and require mandatory appointments for career advice prior to registering for subsequent semester courses. The center could invite guest speakers to share their career experiences with groups of students in related fields of study. Such a center would eliminate the advisement responsibility from the faculty members' job requirements and thus free the faculty for more individualized interactions.

Thus, my second recommendation for Waycross College is to build a faculty-student mentoring program. Groups of students, based on their majors, would be assigned to a faculty mentor. The mentor could be available to his/her assigned students for continued support and encouragement. While the faculty at Waycross College may not be initially receptive to the idea, they could be reminded of the grueling four-week long pre-registration period in which they are currently required to devote at least forty-eight hours of advising time. Through the mentoring program, they could possibly schedule a one-hour faculty-student mentor meeting once a month. At the meeting, they could engage in round table discussions that would allow the students an opportunity to talk about their experiences with others in the same field of study. These meetings could double as a peer support group as well, possibly fostering a better connection between the students and their declared majors. If time and the faculty-student ratio are deemed a problem for faculty, the mentoring program could initially be created to target major areas that have low enrollments.

REFERENCES

American Association of University Women (AAUW). (1991). *Shortchanging Girls, Shortchanging America*. Washington, DC: AAUW Educational Foundation and National Education Association.

American Association of Colleges and Universities (AACU). (2005). *Student engagement survey highlights challenges faced by community colleges*. Retrieved September 2, 2005, from http://www.aacu-edu.org/aacu_news/AACUNews05/May05/facts_figures.cfm

Anderson, E. (2003). *Feminist epistemology and philosophy of science*. Retrieved May 1, 2004, from http://plato.stanford.edu/entries/feminismepistemology.html

Ardovini-Brooker, J. (2001). *The debate and unresolved issues surrounding feminist research and its distinction from mainstream research*. Retrieved May 1, 2004, from http://www.advancingwomen.com/awl/winter2001/Ardovini-Brooker.htm

Bart, J. (1998). *Feminist theories of knowledge: The good, the bad, and the ugly*. Retrieved May 5, 2004 from Sweet Briar College Dean's Office website: http://www.dean.sbc.edu/bart.html

Campbell, P. B., & Clewell, B. C. (1999). Science, math, and girls…still a long way to go. *Education Week, 19*(2), 50-51.

Clewell, B. C., Anderson, B. T., & Thorpe, M. E. (1992). *Breaking the barriers*. San Francisco: Jossey-Bass Publishers.

Collins, P. H. (1990). *Black feminist thought: Knowledge, consciousness, and the politics of empowerment.* New York: Routledge.

Community College Survey of Student Engagement (2004). Retrieved September 20,

2005, from http://www.ccsse.org.

Davis, C. S., Ginorio, A. B., Hollenshead, C. S., Lazarus, B. B., and Rayman, P. M. (1996). *The equity equation: Fostering the advancement of women in the sciences, mathematics, and engineering*. San Francisco: Jossey-Bass.

Denzin, N., & Lincoln, Y. (1998). *The landscape of qualitative research*. Thousand Oaks, CA: Sage Publications, Inc.

Enman, M., & Lupart, J. (2000). Talented female students' resistance to science: An exploratory study of post-secondary achievement motivation, persistence, and epistemological characteristics. *High Ability Studies, 11*(2), 161-178.

Erwin, L., & Maurutto, P. (1998). Beyond access: Considering gender deficits in science education. *Gender and Education, 10*(1), 51-70.

Etzkowitz, H., Kemelgor, C., & Uzzi, B. (2000). *Athena Unbound*. New York: Cambridge University Press.

Ganeshananthan, V., & Reisberg, L. (2000). Math scores improve on the SAT while ACT scores remain stable. *The Chronicle of Higher Education, 41*(2), 68.

Gavin, K. M. (1996). The development of math talent: Influences on students at a women's college. *Journal of Secondary Gifted Education, 7*(4), 476-486.

Harding, S. (ed.). (2003). *The feminist standpoint theory reader: Intellectual & political controversies.* New York: Routledge.

Harding, S. (1997). Comment on Hekman's "Truth and method: Feminist standpoint theory revisited": Whose standpoint needs the regimes of truth and reality? *Signs, 22*(2), 382-391.

Harding, S. (1991). *Whose science? Whose knowledge? Thinking from women's lives.*

New York: Cornell University Press.

Harding, S., & Hintikka, M. (1983). Discovering reality: Feminist perspectives on epistemology, metaphysics, methodology, and philosophy of science. In Wyer, M., Barbercheck, M., Giesman, D., Ozturk, H., & Wayne, M. (eds.), *Women, science, and technology.* New York: Routledge.

Hartsock, N. (1997). The feminist standpoint. In Harding, S., & Hintikka, M. (eds.), *Discovering Reality.* Boston: D. Riedel Publishing Company.

Hennessy, R. (1993). Women's lives/feminist knowledge: Feminist standpoint as ideology critique. *Hypatia, 8* (1), 14-34.

Hollenshead, C., Yonce, P. S., & Wenzel, S. A. (1994). Women graduate students in mathematics and physics: Reflections on success. *Journal of Women and Minorities in Science and Engineering, 1*(1), 63-88.

Jaggar, A., & Bordo, S. (1989). *Gender/Body/Knowledge: Feminist reconstructions of being and knowing*. New Jersey: Rutgers University Press.

Jayaratne, T. E., & Stewart, A. J. (1991). Quantitative and qualitative methods in the social sciences. In M. M. Fonow & J. A. Cook (Eds.), *Beyond methodology: Feminist scholarship as lived research* (pp. 85-106). Bloomington: Indiana University Press.

Jeffe, D. B. (1993). *Reasons, motivation, and gender: A description and analysis of reasons for science-career choice*. Unpublished doctoral dissertation, Washington University.

Laanan, F. S. (2003). Degree aspirations of two-year college students. *Community College Journal of Research and Practice, 27,* 495-518.

Levesque-Lopman, L. (2000). Listen, and you will hear: Reflections on interviewing from a feminist phenomenological perspective. In Fisher, L., & Embree, L. (eds.), *Feminist Phenomenology.* Netherlands: Kluwer Academic Publishers.

Mervis, J. (2001). What keeps girls out of science. *Science Now, 7*(1), 3.

Miller, L., Petra, L., & Kotte, D. (2002). On decreasing gender differences and attitudinal changes: Factors influencing Australian and English pupils' choice of a career in science. *Psychology, Evolution, and Gender, 4*(1), 69-92.

Monhardt, R. M., Tillotson, J. W., & Veronesi, P. D. (1999). Same destination, different journeys: A comparison of male and female views on becoming and being a scientist. *International Journal of Science Education, 21*(5), 533-551.

National Center for Educational Statistics (2001). Retrieved September 20, 2005, from http://nces.ed.gov/pubs2005/2005025c1.pdf.

Nottingham Trent University. (n.d.). *Session 14: Standpoint Theory*. Retrieved May 1, 2004, from http://human.ntu.ac.uk/pgcert/14.femstandpoint/session14.html

Olson, G. M. (1993). *Correlates of career choice among college women*. Unpublished doctoral dissertation, University of Oklahoma.

Phillippe, K. A., & Valiga, M. J. (2000). *Faces of the Future: A Portrait of America's Community College Students.* Washington, DC: American Association of Community Colleges (ERIC Document Reproduction Service No. ED 439 760).

Pohlhaus, G. (2002). Knowing communities: An investigation of Harding's standpoint epistemology. *Social Epistemology, 16* (3), 283-293.

Quimbita, G. (1991). *Preparing women and minorities for careers in math and science:*

The role of community colleges. Eric digest. Retrieved June 5, 2005, from http://www.ericdigests.org/pre-9220/women.htm

Quinn, D. M., & Spencer, S. J. (2001). The interference of stereotype threat with women's generation of mathematical problem-solving strategies. *Journal of Social Issues, 57*(1), 55-71.

Richardson, G., Hammerich, P., & Livingston, B. (2003). Improving elementary school girls' attitudes, perceptions, and achievement in science and mathematics: Hindsights and new visions of the Sisters in Science program as an equity reform model. *Journal of Women and Minorities in Science and Engineering, 9*, 333-348.

Roger, A., & Duffield, J. (2000). Factors underlying persistent gendered option choices in school science and technology in Scotland. *Gender and Education, 12*(3), 367-383.

Rose, H. (1983). Hand, brain, and heart: A feminist epistemology for the natural sciences. *Signs, 9*(1), 73-90.

Rosser, S. V. (2003). Attracting and retaining women in science and engineering. *Academe, 89*(4), 24-29.

Rosser, S. V., & Lane, E. O. (2002). Key barriers for academic institutions seeking to retain female scientist and engineers: Family-unfriendly policies, low numbers, stereotypes, and harassment. *Journal of Women and Minorities in Science and Engineering, 8*(2), 161-189.

Rosser, S. V. (1990). Retaining women in engineering. *Liberal Education, 73*(3), 43-44.

Sax, L. J. (1994). *The dynamics of 'tokenism': How college students are affected by the proportion of women in their major*. Unpublished doctoral dissertation, University of California, Los Angeles.

Saye, D. B. (2002). *The road seldom taken: Status of women in mathematics departments in colleges and universities in Georgia*. Unpublished doctoral dissertation, Georgia Southern University, Statesboro, Georgia.

Sayers, M. P. (1987). *The relationship of self-efficacy expectations, interests, and academic ability to the selection of science and nonscience college majors*. Unpublished doctoral dissertation, University of Kansas.

Scanlon, K. C. (1994). *Parental influence on the career life planning of undergraduate women in a four-year college*. Unpublished doctoral dissertation, University of Pittsburgh.

Seymour, E., & Hewitt, N. (1997). *Talking About Leaving: Why Undergraduates Leave the Sciences*. Boulder, CO: Westview Press.

Smith, D. (1987). *The everyday world as problematic: A feminist sociology*. Boston: Northeastern University Press.

Subotnik, R. F., Stone, K. M., & Steiner, C. (2001). Lost generation of elite talent in science. *Journal of Secondary Gifted Education, 13*(1), 33+.

Taber, K. S. (1992). Science-relatedness and gender-appropriateness of careers: Some pupil perceptions. *Research in Science and Technology Education, 10*(1), 105+.

Terry, J. M., & Baird, W. E. (1997). What factors affect attitudes toward women in science held by high school biology student? *School Science and Mathematics, 97*(2), 78-86.

Tiedemann, J. (2000). Parents' gender stereotypes and teachers' beliefs as predictors of children's concept of their mathematical ability in elementary school. *Journal of Educational Psychology, 92*(1), 144-151.

Tiedemann, J. (2002). Teachers' gender stereotypes as determinants of teacher perceptions in elementary school mathematics. *Educational Studies in Mathematics, 50*, 49-62.

Townsend, B. K. (2003). The two-year college as a first choice, second chance institution for baccalaureate-degree holders. *Community College Journal of Research & Practice, 27*(4), 273-289.

Waycross College Catalog. (2006-2008). Waycross, GA: Office of Admissions.

APPENDICES

APPENDIX A
GEORGIA SOUTHERN UNIVERSITY IRB APPROVAL LETTER

Georgia Southern University
Office of Research Services & Sponsored Programs

Institutional Review Board (IRB)

Phone: 912-681-5465
Fax: 912-681-0719
Ovrsight@GeorgiaSouthern.edu
Administrative Annex
P.O. Box 8005
Statesboro, GA 30460

To: Lisa Howell
2001 South Georgia Parkway
Waycross, GA 31501

CC: Dr. Delores Liston, Faculty Advisor
P.O. Box 8144

From: Office of Research Services and Sponsored Programs
Administrative Support Office for Research Oversight Committees
(IACUC/IBC/IRB)

Date: November 7, 2005

Subject: Status of Application for Approval to Utilize Human Subjects in Research

After a review of your proposed research project numbered: H06073, and titled **"Lived Experiences of Female Science Majors at a Two-Year College"**, it appears that (1) the research subjects are at minimal risk, (2) appropriate safeguards are planned, and (3) the research activities involve only procedures which are allowable.

Therefore, as authorized in the Federal Policy for the Protection of Human Subjects, I am pleased to notify you that the Institutional Review Board has approved your proposed research.

This IRB approval is in effect for one year from the date of this letter. If at the end of that time, there have been no changes to the research protocol, you may request an extension of the approval period for an additional year. In the interim, please provide the IRB with any information concerning any significant adverse event, **whether or not it is believed to be related to the study**, within five working days of the event. In addition, if a change or modification of the approved methodology becomes necessary, you must notify the IRB Coordinator **prior** to initiating any such changes or modifications. At that time, an amended application for IRB approval may be submitted. Upon completion of your data collection, you are required to complete a *Research Study Termination* form to notify the IRB Coordinator, so your file may be closed.

Sincerely,

Julie B. Cole

Julie B. Cole
Director of Research Services and Sponsored Programs

APPENDIX B
WAYCROSS COLLEGE HUMAN SUBJECTS RESEARCH APPROVAL LETTER

Waycross College

2001 South Georgia Parkway
Waycross, Georgia 31503

Phone 912-285-6134
Fax 912-287-4909
E-mail blosty@waycross.edu

Memorandum

DATE: October 25, 2005

TO: Members of the Georgia Southern University Institutional Review Board

FROM: Barbara P. Losty, President

SUBJ: **Human Subjects Request by Lisa Norton Howell**

Ms. Howell's dissertation research would require use of students at Waycross College as subjects. If your review board approves her proposal, Waycross College is happy to cooperate by permitting use of our students. Because we are a freshman-sophomore institution, our students rarely have the opportunity to volunteer for approved research. I believe that study may make at least some aware of research in education and could encourage them to consider such a career.

Please do contact me, if you have questions. I have no hesitation about entrusting our students to Ms. Howell.

dm

APPENDIX C
PARTICIPANT LETTER OF INFORMED CONSENT

COLLEGE OF EDUCATION

DEPARTMENT OF CURRICULUM, FOUNDATIONS, AND READING

Dear Participant:

My name is Lisa Howell. I am an Assistant Professor of Mathematics at Waycross College. I am currently pursuing my Doctorate of Education from Georgia Southern University. Part of my degree requirements is to conduct a research study. The title of my research study is "Lived Experiences of Female Science Majors at a Two-Year College". The purpose of this research study is to gain a better understanding of what females are encountering during their first year as a science major at Waycross College. Experiences, both inside and outside of the classroom, will be explored through an interview process. As a first year female science major at Waycross College, you will be asked questions regarding your experiences with instructors, advisors, family, and friends relevant to your major. There are no risks in participating in this research beyond those experienced in everyday life. By participating in this study, you may learn more about yourself. You might have a better understanding of your major and your career aspirations after participating in the interviews. The study will consist of two interview sessions, one in fall semester 2005 and one in spring semester 2006. Each audio taped interview session should last about 30 minutes. All tapes and records gathered from the sessions will be securely locked in a file box located in a secure location. Only two people will have access to the records and your identity, my advisor, Dr. Delores Liston, and this researcher, Lisa Howell. All audio tapes of the interview will be destroyed by July 2007. If this research is published, no information that would identify you will be written. You can ask questions about the research by contacting me at 912-283-6138 or my advisor at 912-871-1551. If you have questions about your rights as a research participant or the process of IRB approval, contact the Office of Research Services and Sponsored Programs at 912-486-7758 or email oversight@georgiasouthern.edu. Participation in this research study is voluntary. You can end your participation at any time with no further questions asked. You do not have to answer any questions you do not want to answer. You must be 18 years of age or older to consent to participate in this research study. If you consent to participate in this research study and to the terms above,

please sign your name and indicate the date below. You will be given a copy of this consent form to keep for your records.

Title of Project:	Lived Experiences of Female Science Majors at a Two-Year College
Principal Investigator:	Lisa Howell, 2001 South Georgia Parkway, Waycross, GA 31503, 912-285-6138, lhowell@waycross.edu
Faculty Advisor:	Dr. Delores Liston, P.O. Box 8144, Statesboro, GA 30460, 912-871-1551, listond@georgiasouthern.edu

_____ _____

Participant Signature Date

I, the undersigned, verify that the above informed consent procedure has been followed.

_____ _____

Investigator Signature Date

APPENDIX D
INTERVIEW GUIDE

- What is your current major?
- What are some reasons why you chose this major?
- Does that label reflect what you want to do as a career?
- Describe your plan in terms of where you are now and where you want to be someday.
- When did you first realize that this is what you wanted to do?
- Describe events that lead up to your choice of major.
- How do you typically make important life decisions?
- In what ways do parents, peers, and your significant other influence your career decisions?
- What other factors have influenced your career decisions?
- Describe your academic interests in terms of your career choice.
- Describe your extracurricular activities in terms of your career choice.
- Discuss your advising experiences regarding your degree and career aspirations.
- Discuss your classroom experiences including interactions with instructors and classmates.
- Considering your major and career aspirations, why did you choose Waycross College?

Demographic Questions

  - Age

- Ethnicity
- High school math/science courses taken and grades
- High school GPA
- Parents' levels of education
- Income status

Additional question for second interview if a participant changes her major.

- Explain your reasons for changing your major.

APPENDIX E
DATA SUMMATION CHART

	Major	Career Aspirations	Reason for Major	Experience with Parents	Experience with Friends	Experience with Signif. Other	Experience with Advising	Experience Classroom (Inst/ Student)
#1								
#2								
#3								
#4								
#5								
#6								
#7								